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POST-OPERATIVE RESULTS IN LESIONS INVOLVING THE SPINAL CORD AND CAUDA EQUINA*

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DURING the past ten years approximately 90 patients have been operated upon for a variety of pathological lesions which have produced disabling symptoms and signs from involvement of the spinal cord and cauda equina. Eighty-three of these have been followed up, and the information obtained is being presented to show the results which may be obtained by surgical intervention. Little will be said about diagnosis apart from the group of patients operated upon for protruded intervertebral disc in the lumbar region, a pathological lesion which has been increasing in interest and frequency during the past few years.

TABLE I.

CLINICAL MATERIAL

	As to pathology	*As to situation*		
	Total	*Cervical*	*Thoracic*	*Lumbar*
Neurofibroma	17	5	9	3
Meningioma	12	3	9	..
Protruded intervertebral disc	12	3	1	8
Glioma	9	3	3	3
Carcinoma	8	2	5	1
Sarcoma: lymphosarcoma	8	3	4	1
Lipoma	4	..	..	4
Inflammatory mass	4	1	2	1
Chordoma	3	..	1	2
Dermoid	2	..	..	2
Arachnoiditis	2	..	2	..
Cavernous hæmangioma & aneurysm	2	1	..	1
	83	21	36	26

NEUROFIBROMAS AND MENINGIOMAS

The 29 neurofibromas and meningiomas represent somewhat over a third of all the patients. Fortunately these tumours are benign. The typical lesion is a solid intra-dural tumour about the size of the tip of one's thumb. The meningioma has an attachment to the dura which must be resected with the tumour to prevent recurrence. The neurofibroma is so closely associated with the involved nerve-root that resection of the root is necessary, a minor matter in the thoracic region where these tumours are commonest. In the cervical or lumbar region the destruction of an important nerve-root may result in some permanent partial disability, usually not enough to interfere with efficient work. Figs. 1 and 2 illustrate the tumours under discussion.

The following two cases are described to illustrate fairly typical end-results and histories in this group.

CASE 1

Mrs. J. Meningioma. Referred by Dr. Hyland. Aged 28 years. Operation, August, 1929. Gradual onset of clumsiness in the legs with little subjective sensory change. A definite history of root-pain in the region of the second thoracic segment on the right side brought on by coughing or sneezing. Objective examination showed slight diminution for pin-scrape up to the second thoracic on the back. Lumbar puncture showed a complete block and an increased protein content in the fluid. Recently, slight difficulty in starting micturition. Motor power still good in legs. Abdominal reflexes were absent; ankle and knee reflexes very active, with a positive Babinski sign on each side. Lipiodol was held up in the upper thoracic region. Following operation she has remained perfectly well.

CASE 2

Mrs. D. Neurofibroma. Referred by Dr. E. Janes. Aged 54 years. Operation, May, 1932. Removal of extra-dural neurofibroma at the level of the 11th thoracic vertebra. History of pain down outside of both legs and through hips for nine years; three years ago she

* Clinical material from the Neuro-surgical Division of the Department of Surgery in the Toronto General Hospital. Presented before the Ontario Medical Association in Hamilton, June 2, 1939.

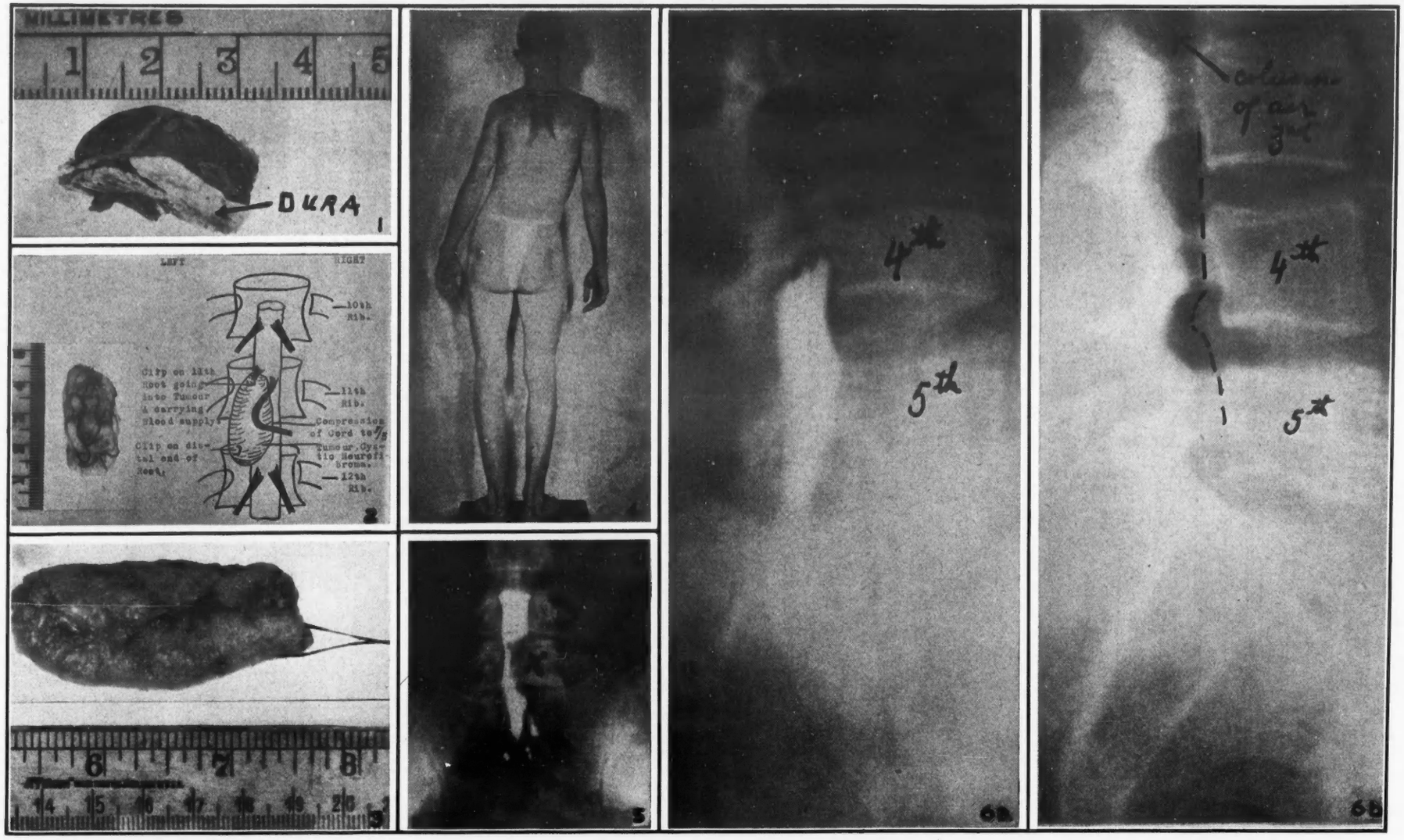


Fig. 1.—Meningioma showing dural attachment. **Fig. 2.**—Neurofibroma showing attachment to nerve root. **Fig. 3.**—Glioma (ependymoma), removed from the centre of the cervical cord (Mr. McK.). **Fig. 4.**—Sciatic listing. Reproduced through the courtesy of the *Southern Medical Journal*, Vol. 31, May, 1938. Dr. E. F. Fincher. **Fig. 5.**—Typical filling defect shown with lipiodol. **Figs. 6a and 6b.**—Illustrate lipiodol and air injections on the same patient. At operation there was marked protrusion of the intervertebral disc between 4th and 5th; this only shows moderately well with lipiodol but is very definitely shown with air. As yet we have not been able to obtain satisfactory visualization with air between fifth lumbar and sacrum. The filling defect with air is marked out with ink as it does not show particularly well in the reproduction but was very definite in the original film.

started to walk with a cane; had difficulty in retaining urine and emptying bladder for two years. Examination showed absent reflexes at knees and ankles with marked diminution for light touch but slight for pain up to twelfth segment, where there was a band of hyperæsthesia. Lumbar puncture gave yellow fluid with complete block. At operation a large extra-dural tumour was removed from the upper lumbar region. Following operation practically normal function of the legs and bladder was regained; pain was relieved, and the patient remains well.

As a group many of these patients have severe pain when coughing, sneezing, or straining, because increased intracranial pressure causes the tumour to impinge on a nerve root. Pressure on the cord produces a gradual onset of spastic paraplegia, usually starting on one side, as well as some diminution of sensation below the lesion. It is important in the diagnosis to rule out pernicious anæmia associated with combined sclerosis of the cord, and also disseminated sclerosis. If there is any doubt about the diagnosis a lumbar puncture and Queckenstedt test usually shows an increase of total protein as well as a block in the cerebrospinal fluid pathway about the cord in the presence of a tumour. If there is evidence of a block, lipiodol will be held up at the site of the lesion and provide information to ensure accurate exposure of the lesion by operation.

In these 29 patients there were no deaths, and, with few exceptions they have returned to work with little or no disability. In a few instances spastic weakness of the legs has persisted because the patient had been paralyzed for some months before operation, but even in these few patients there has been such remarkable improvement that they have been able to walk. On the whole the results have been highly satisfactory to doctor and patient.

PROTRUDED INTERVERTEBRAL DISC. (A definite pathological lesion and a common cause of persistent low back pain and sciatica).

Twelve patients with protruded intervertebral disc represent the second largest group in this series. Future statistics will probably show that this lesion is by far the commonest cause of pressure on a lumbar root, and as a result the outstanding cause of persistent and disabling sciatica and low back pain. The lesion has only been clearly recognized during the past five years and as yet our group is relatively small, most of the patients having been operated upon during the past eighteen months.

Each intervertebral disc is composed of a peripheral area of fibrocartilage called the annulus fibrosus, which encloses under pressure a soft pulpy centre called the nucleus pulposus. If the annulus gives way posteriorly because of trauma or trauma and disease the nucleus extrudes itself along with the fragmented annulus and impinges on the adjacent nerve root. Most commonly the disc involved is the fourth or fifth lumbar, producing pressure on the fifth lumbar and first sacral roots respectively. Figs. 7 and 8 illustrate characteristic lesions as seen at operation. A clear history of trauma is not always available. The lesion is most common in men and in the vast majority of cases it is the fourth or fifth intervertebral disc that is involved, so that in the typical case involvement of the fifth lumbar or first sacral nerve produces sciatic pain, diminished or absent ankle reflex, some weakness of the muscles about the ankle, and diminished sensation over the outer side of the lower leg and foot. During the acute phase of the attack there is severe low back pain and muscle spasm, the patient walks in flexion tilted away from the side involved (Fig. 4). Most patients have a history of repeated bouts of disabling pain. It is rather difficult to explain the intermittency of symptoms; the protruded portion of disc may conceivably shift its position or be more œdematous at one time than another. There is considerable variation in the positive findings with reference to sensory and reflex changes. A number of our patients have shown little apart from lumbar rigidity and exacerbation of pain on extension of the thigh. In our experience flexion or straight-leg raising is tolerated better than extension when the patient is lying on his face. In general, it is our opinion that a disabling persistent low back pain which radiates down one thigh is more likely due to a protruded disc than to any other lesion. The final diagnostic procedure is the visualization of a filling defect in the suspected area after a lipiodol or air injection (Fig. 5). In our experience air (Fig. 6) gives a satisfactory visualization of all the lumbar discs except the fifth. There have been no untoward results from the use of lipiodol, but it is likely that air will ultimately supplant lipiodol. The differential diagnosis of low back pain and sciatica has been very efficiently considered by J. A. Leo Walker.[1]

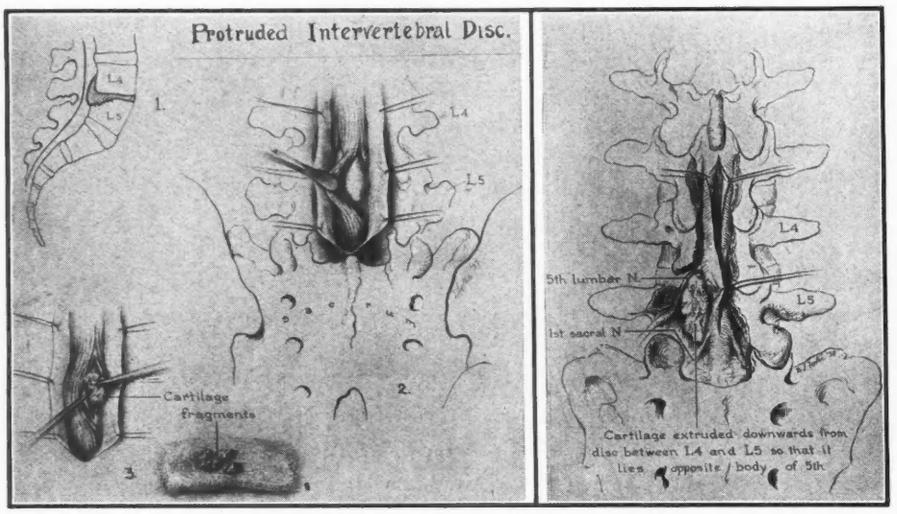
CASE 3

Dr. W., aged 28 years. Operation, November, 1938, removal of protruded disc. Ten years ago he sat down hard and feels that his back has never been quite right

since. Intermittent attacks of severe sciatica involving the right leg for five years; the recent attack has been present for two or three months. Examination showed rigid lumbar spine; atrophy of right buttock, thigh and leg; absent right ankle jerk; no sensory diminution on most careful testing. Lipiodol showed filling defect opposite the body of the fifth. At operation there was a marked protrusion of the fragmented fifth disc, causing pressure on the first sacral root. The patient was able to get about freely three weeks after operation and in another few weeks play golf without pain.

In 12 patients operated upon the lesion was in the thoracic region in four and in the lumbar in eight. In the thoracic cases the lesion tends to be much smaller. Two of these patients have made highly satisfactory recoveries; one patient has remained paralyzed as before operation; the fourth is able to walk, but is very spastic. The eight patients with a lumbar lesion have done well, apart from one patient who is considerably improved, but has failed to work, largely, I think, because he has become a confirmed invalid and makes the most of any disability he has. There have been no operative deaths. The question arises as to whether these patients can do hard labour after operation.

One patient, Earl L., aged 20 years, operated upon in September, 1937, writes on March 7, 1939: "I am feeling fine and I am working on the farm every day. I can do all the work that has to be done on the farm whether it is heavy lifting, walking, bending over, forking hay, manure, or anything at all, and it doesn't seem to bother me any. I also feel no effects of the operation".



Figs. 7 and 8.—Protruded intervertebral disc.

GLIOMA

It is interesting to note that gliomas involving the cord are relatively less frequent than in the brain. In the cord these infiltrating tumours tend to be much more benign than those involving the brain. In four out of the nine patients very satisfactory results have been obtained.

CASE 4

One of these patients, Mr. McK., is of great interest because of the size of the intramedullary glioma (ependymoma) Fig. 3. He was operated upon in October, 1934, because of progressive weakness, wasting of his hands and arms for three years, and weakness of the legs for five months; he was barely able to walk at the time he was operated upon. He has made a remarkable improvement following operation and has continued to do a great deal of useful work on his farm, despite the (marked) residual disability of marked weakness and spasticity of all four limbs. He is able to feed stock, drive a team, and in general keep busy at useful work.

CARCINOMA

Eight patients had secondary carcinoma. A correct pre-operative diagnosis had been made in most cases because of a history of carcinoma elsewhere in the body and also because of the bone destruction of the spine. Operation was carried out in the hope that pain might be relieved, or, in a few patients, in the hope that paralysis might be relieved for a period of months. In no instance was operation really worth while. Our experience would lead us to feel that in future we will not operate on these patients if a pre-operative diagnosis can be made.

LYMPHOSARCOMA

Eight patients. This group is of some interest because two patients operated upon in 1933 and 1934 have made rather remarkable recoveries, and possibly are permanently cured. Both of these patients were unable to walk. At operation a long cuff of extra-dural lymphosarcoma was disclosed over a distance of several inches in the thoracic region. Both patients responded to the decompression laminectomy, and especially to x-ray treatment, which undoubtedly was the important factor in their remaining well six and five years after operation and x-ray treatment. Six other patients died soon after operation despite x-ray treatment.

LIPOMA

Four patients. In each instance the lesion produced a cauda equina syndrome consisting of loss of bladder control, pain in the legs, disturbed sensation and weakness of the legs. The tumours varied from a large mass which could be palpated beneath the skin and extending into the cord through the dura, to a lesion which was entirely intra-dural and infiltrating the lower end of the cord. Three of these patients have been greatly benefited by operation in that their pain has been relieved and they have gained considerable strength in their legs, so that they are able to walk. One especially has had a very satisfactory result; she was operated upon in 1936, and has recently had a baby.

CHORDOMA

Three patients. This lesion is a large, soft tumour which arises in the lower lumbar and sacral region from a remnant of the notochord. The x-ray plates of all three patients showed a large defect in the posterior aspect of the sacrum. These patients came for medical advice because of progressive weakness and loss of sensation in the legs, loss of bladder control, and severe pain in the lower back and down the legs. Neurological examination showed a lower motor neuron lesion with sacral roots. One of these patients had a radical removal of the tumour in 1933, at the age of 19 years. He has developed a very satisfactory automatic bladder, is able to work every day despite considerable weakness and loss of sensation in the legs. The other two patients continued to be bed-ridden after operation; one died four years after operation from genito-urinary infection, and the other, operated upon in 1935, will die soon.

EXTRA-DURAL INFLAMMATION

Four patients. The clinical story is rather uniform—a history of infection, usually a boil, followed some weeks later by severe pain in the back, high temperature; paralysis comes on rapidly over a period of a few days. At operation pus is found in the extra-dural fat. In some cases it is necessary to do a laminectomy from top to bottom to carry out efficient drainage; in other cases the inflammation remains much more localized. There have been two very satisfactory results; these patients were completely paralyzed, they are now practically well. One patient is barely able to get about because of spastic paralysis of the legs; the fourth patient died from general toxæmia and septicæmia some weeks after operation.

DERMOID

Two patients. In each instance the lesion was infiltrating the lower end of the cord and was causing pressure on the cauda equina. One patient, operated upon in 1926, was greatly improved, was able to work as a farmer for nine years, subsequently dying of genito-urinary infection. A more recent patient, operated upon by Dr. Botterell in 1937, has been relieved of his pain but there is still very marked residual weakness of the legs and poor bladder function.

ARACHNOIDITIS

Two patients. In each instance the cerebro-spinal fluid was held in pockets about the spinal cord by chronic inflammatory reaction in the arachnoid. No improvement followed operation in either of these patients. Undoubtedly in both the inflammatory reaction had caused actual destruction of the spinal cord itself.

CAVERNOUS HÆMANGIOMA AND ANEURYSM

Two patients. In one the spinal cord was infiltrated by a large mass of thin-walled vessels in the thoracic region. The patient had spastic paralysis of the legs associated with sensory loss; nothing could be accomplished at operation. In the second patient a very satisfactory result has been obtained. There was a large extra-dural thin-walled aneurysm in the cervical region causing severe pressure on the cervical cord, producing paralysis which prevented the patient from walking or using her hands; she also had a great deal of pain. The aneurysm was opened and bleeding controlled with a muscle pack; a large abnormal artery in the neck was also tied. This patient has remained well and able to work since 1936.

SUMMARY AND CONCLUSION

Eighty-three patients were operated upon. An excellent result was obtained in 42, and a result that was worth while in twelve. If the carcinoma patients are deleted, a group in which we now believe surgery is not worth while, it is fair to state that 75 per cent of patients suffering from interference of function of the spinal cord or cauda equina from the various lesions considered in this report will be benefited by surgery. Laminectomy is a safe procedure. There has been no operative mortality apart from a number of the carcinoma patients who died in hospital some time after operation.

REFERENCE

1. WALKER, J. A. L.: Low back pain and sciatica, *Canad. M. Ass. J.*, 1939, **40**: 240.

A NEW METHOD OF REPAIRING THE ANTERIOR CRUCIAL LIGAMENT OF THE KNEE*

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INJURIES of one or other of the crucial ligaments in the knee, while not common, cause very grave interference with the stability of the joint.

Some time ago I described in this *Journal*[1] an operation devised for the repair of the posterior crucial ligament. I have used this method in three cases, and my confrère, Dr. R. R. Fitzgerald, has done two additional cases, all with gratifying results. The value of the operation consisted in an anatomical replacement of the damaged ligament, using the tendon of the semitendinosus muscle, and done through a single incision without entering the synovial cavity. Previous methods of replacing the ligaments have necessitated the use of two incisions, one of which opened the knee-joint, thus greatly increasing the hazard. In that paper I suggested the possibility of using a corresponding method for the repair of the anterior crucial ligament, but until recently I have not had an opportunity to put it to the test.

It will be remembered that the anterior crucial ligament is attached to the spine of the tibia, and that it runs upward and backward, to be attached to the medial side of the lateral condyle of the femur at its posterior part. The ligament thus becomes relaxed in flexion of the knee, taut when the knee is fully extended, and prevents forward displacement of the tibia in relation to the femur. When an injury occurs to the anterior crucial ligament it is frequently associated with an avulsion of the spine of the tibia, and, given an adequate period of fixation in a cast, a natural repair will be brought about, but not always.

During the past summer I had the opportunity, through the courtesy of my associate, Dr. Fraser B. Gurd, of operating on a young man who had sustained a severe injury to this ligament.

In studying the anatomy of the knee-joint I was impressed with the fact that while the crucial ligaments are within the capsule of the joint they are actually extra-synovial. The anterior surfaces of the ligaments are invested by the synovial membrane, but the ligaments themselves lie in the intercondyloid space, which is not included in the synovial cavity.

It seemed feasible to use a wide strip of the fascia lata of the thigh, the ilio-tibial band, detaching it above and leaving it attached below to the tuberosity of the tibia, then introducing it through tunnels in the tibia and the femur in such a way as to replace the damaged ligament. This I was able to do without exposing the joint.

CASE REPORT

The patient was a vigorous young man, twenty-two years old, who on July 5, 1938, was working in a gravel pit which caved in. As he attempted to run over the rolling stones his right knee gave way under him and he fell helpless. He had to be carried away. The knee became greatly swollen and was put in a plaster cast. Additional casts were applied from time to time, but the joint remained very unstable and he was unable to use it without support. He was admitted to the Montreal General Hospital on two occasions during the fall of 1938, was given a course of physiotherapy, and was supplied with a knee-cage. Finally he was readmitted on May 15, 1939, asking that something be done to give him the use of his leg.

On examination the head of the tibia could be moved forward in relation to the femur, and on attempting to walk the same movement occurred, often abruptly, causing the knee to collapse.

On May 30, 1939, I repaired the ligament in the manner suggested, and his leg was retained in a cast for about two months. On the first of October he returned to his work, which is arduous, and has worked steadily ever since. [The patient was shown at a meeting of the Montreal Medico-Chirurgical Society and demonstrated his capacity to bend and straighten the knee while carrying his full weight on the injured leg.]

The following is a description of the operation, with one or two minor modifications which have since been suggested.

No tourniquet is used. An incision is made on the antero-lateral aspect of the thigh and extends about two inches below the knee. The incision is carried sufficiently high to obtain a strip of the fascia over the vastus lateralis, ten inches long. The skin is reflected so as to expose the deep fascia of the thigh, the lateral condyle of the femur, the lateral tuberosity of the tibia, and the head of the fibula. The fascia, one inch

* Presented, with case, at the meeting of the Montreal Medico-Chirurgical Society, held in the Montreal General Hospital, December 1, 1939.

in width, is freed above, reflected downward across the knee-joint, and left connected below at its attachment to the tuberosity of the tibia in front of the head of the fibula. At the lower end it curves slightly forward.

Using a three-eighths inch drill a hole was made through the lateral tuberosity so as to enter the intercondyloid space (Fig. 1). If the posterior half of the condyle is examined in the skeleton it will be found to resemble a quadrant of a circle which glides on the tibia when the knee is flexed. It is important to enter the drill at a point which represents the centre of the circle of which this is the arc (Fig. 2). In making the tunnel through the lateral condyle the drill is directed slightly downward and backward so as to emerge close to the inferior margin of the condyle, the knee being flexed to avoid any possibility of damage to the major vessels.

With the knee still flexed a second drill-hole is made through the lateral tuberosity of the tibia. The drill enters near the point of attachment of the fascia (about one inch below the level of the knee-joint) and, advancing upward, backward and medially, is so aimed as to emerge at the spine of the tibia. A careful study of the bony skeleton will aid in directing the drill in the proper direction. It is of help, too, in introducing the drill if a similar drill is temporarily left in the tunnel made in the condyle. If properly directed the ends of the two metals will come together. The knee may be gently flexed and extended to assist in detecting the contact. In the average knee the depth of the tunnel through the tibia is about one and three-quarter inches, that in the condyle one-quarter of an inch less. It is useful to introduce a curette through the two drill holes to clear the inner ends of any small bone fragments which may be detached by the drill and would interfere with the steps to follow.

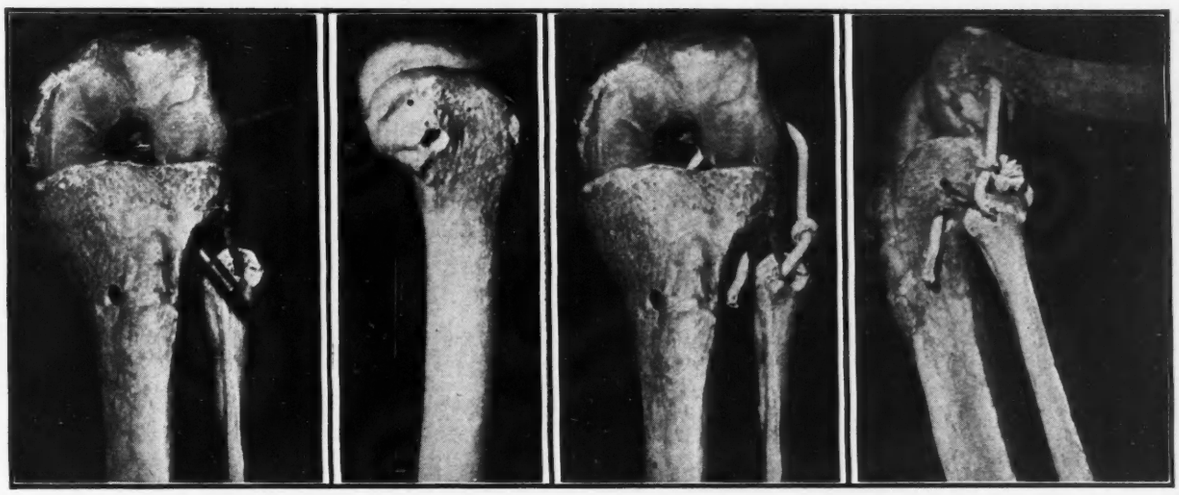

Fig. 1 Fig. 2 Fig. 3 Fig. 4

Fig. 1.—Knee-joint from in front, showing drills introduced through the lateral tuberosity of the tibia and the lateral condyle of the femur, converging in the intercondyloid space. **Fig. 2.**—Lower end of femur. The entrance of the tunnel through the lateral condyle is in the centre of the arc on which the condyle glides in flexion and extension of the knee. **Fig. 3.**—Knee-joint from in front, indicating the position of the fascia, running from its attachment to the lateral tuberosity of the tibia through the tibia to the tibial spine, through the lateral condyle of the femur, through the head of the fibula and anchored to itself. **Fig. 4.**—Lateral view of the knee-joint showing the course of the fascia. Compare Fig. 3.

A double strand of flexible wire is pushed through the tunnel in the tibia so as to enter the intercondyloid space at the spine of the tibia. An alligator forceps (Fig. 5), such as is used by the laryngologist to extract foreign bodies, is now introduced through the tunnel in the condyle in order to grasp the loop of wire. This type of instrument is absolutely essential, because while an ordinary pair of small forceps

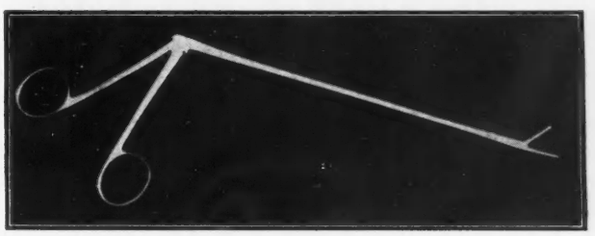

Fig. 5.—Alligator forceps used to withdraw the wire from the intercondyloid space through the tunnel in the lateral condyle.

can be introduced into the tunnel it is impossible to separate the handles so as to grasp the wire. This step may demand a little patience, but if the knee is flexed so as to bring the inner opening of the tunnel through the condyle opposite the corresponding opening at the tibial spine the metallic loop can be detected and withdrawn through the condyle.

The free end of the fascia is securely fastened to the lower end of one strand of wire as it enters the tibia. The wire with the fascia following is carefully drawn in through the lower tunnel, out through the upper, and pulled as snugly as possible. Care should be taken to taper the entering end of the fascia so that it may not become obstructed in its passage. Twisting of the fascia adds to its strength. The second strand of wire is meanwhile left in place in the tunnels in case of mishap.

A drill hole is now made through the head of the fibula, taking care to avoid the external popliteal nerve. The end of the fascia is pulled through the head of the fibula from before backward, the fascia being made as taut as possible. It will be found that flexing the knee about thirty degrees will permit the fascia to be drawn to a maximum degree of tautness, after which the free extremity of the fascia can be split longitudinally, the ends brought around the portion entering the fibula and securely anchored with strong silk. The course of the reconstructed ligaments is indicated in Figs. 3 and 4.

A reinforcing silk suture may be placed in the fascia as it emerges from the condyle.

An effort should be made to close the gap from which the fascia was taken, especially in the region above and below the knee, although this is somewhat difficult. The passage of the fascia through the head of fibula, however, reinforces the lateral ligament of the knee. It will be noted, too, that the care taken to choose the proper site of entrance for the drill hole in the lateral condyle ensures the tautness of the newly-placed ligament even when the knee is flexed and extended, which would not obtain if the openings were placed eccentrically. The skin is closed with interrupted catgut sutures, obviating the necessity of disturbing the cast which is so applied as to maintain the partially flexed position of the knee. The cast is retained for at least two months after which knee exercises are practised, the patient avoiding weight-bearing for an additional month.

REFERENCE

1. TEES, F. J.: Injuries of the crucial ligaments of the knee-joint, with a new method of operating for the repair of the posterior ligament, *Canad. M. Ass. J.*, 1932, **26**: 653.

MISPLACED GASTRIC MUCOSA AS A CAUSE OF MASSIVE RECTAL HÆMORRHAGE*

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FEW signs of gastro-intestinal disease in the adult cause more alarm to the patient or incite more interest in the physician than does a massive hæmorrhage from the rectum. If this be true in the adult where the condition is not uncommon, the occurrence of the same sign in the child should give rise to added interest on account of its rarity. Bleeding from the bowel is passed over in a very cursory manner in most pædiatric textbooks and they afford very little help in solving the problem. The common causes encountered in adults, such as hæmorrhoids, carcinoma of the rectum, ulcerative colitis, cirrhosis of the liver, and peptic ulcer, are seldom seen.

In young children intussusception is stressed as one of the few conditions causing blood in the stools. In the differential diagnosis this can usually be eliminated or confirmed by the discovery of a mass in the abdomen associated with a history of blood and mucus having been passed per rectum. The spasmodic pains followed by intervals of relief is also suggestive. Polyps of the rectum and colon must be given consideration, as they occasionally give rise to quite severe bleeding. Proctoscopic examination gives the best hope of discovering this cause, as polyps in the rectum are usually situated low down. Congenital syphilis may give rise to bleeding, the cause being found in epithelial erosions, ulcerations or fissures. Prolapse of the rectum in children is relatively common and may give

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rise to serious bleeding. Occasionally massive hæmorrhage occurs in babies in the toxic state of summer diarrhœa. Acute ulceration in duodenum or jejunum appears to be the cause. Many less frequent causes are mentioned, such as, hæmorrhagic disease of the newborn, idiopathic ulcerative colitis, Henoch's or visceral purpura, thrombocytopenic purpura, tuberculous or gonorrhœal ulceration, and foreign bodies.

Massive hæmorrhage from the rectum in young subjects without obvious cause often results from an ulcer in Meckel's diverticulum. We have delayed mentioning this condition for two reasons: first, because it is too little emphasized as a cause of bleeding, and, secondly, it is with this disease that we are more particularly interested. In recent years more and more cases have been reported showing that the condition is not uncommon. Eighty-five per cent of the reported cases have occurred in males and 63 per cent were under ten years of age. A mortality figure of 30 per cent has been reported. Of the cases of ulcer in Meckel's diverticulum 75 per cent had bleeding. The bleeding is usually associated with an ulcer either in or adjacent to the heterotopic gastric mucosa but not necessarily so as it may occur in apparently intact mucous membrane. The blood is usually *unmixed* with mucus in the stools. This feature helps to distinguish this condition from intussusception. In view of the many possibilities to go astray the following case proved extremely interesting.

CASE REPORT

The patient was a boy of 6½ years of age who was admitted to the Montreal General Hospital with a massive hæmorrhage from the rectum. One week before admission he began to complain of intermittent attacks of abdominal pain and vomited several times after his meals. The symptoms must have been of a very mild character, as he continued to attend school.

On the afternoon of the admission day, after returning from school, he had a bowel movement which he told his mother was full of blood; his mother could not confirm this statement. However, after the bowel movement he was weak, complained of dizziness, felt cold, and perspired quite freely. He had his supper, and vomited afterwards, but this did not keep him from going out to play for a short time. He went to bed feeling quite well, but woke during the early part of the night complaining of abdominal pain. The bowel movement which was then passed contained about one pint of blood, and was followed by the usual symptoms of blood loss. The patient was then brought to the out-patient department.

The history revealed three previous occasions on which the patient had had attacks of abdominal pain, had vomited, and lost a slight amount of blood in the stools. These attacks occurred eight, twelve, and twenty-four months previous to admission, and only lasted two or three days. The personal and family history revealed nothing of interest.

Examination on admission revealed a rather poorly developed boy who looked extremely sick. He was pale, and the mucous membranes were blanched, but he did not appear to be in any particular pain. The pulse rate was 130, with a slight irregularity, and the systolic blood pressure was 80 mm. A blowing systolic murmur was heard at the apex of the heart, but in other respects the general examination was negative. The abdomen moved freely with respiration; it was soft throughout; no organs or masses were palpable, and there was no tenderness. The hernial sites were clear. Rectal examination was normal, with the exception of the finding of blood on the examining finger. Blood examination showed hgb. 34 per cent, white blood cells 11,600, red blood cells 3,100,000, platelets 462,000, polymorphonuclears 88 per cent; numerous microcytes and macrocytes were seen. The bleeding time was two minutes (Duke method), coagulation time 4½ minutes (Lee and White); the retraction of clot was normal, and the Hess test was negative. The following morning his condition had improved considerably and the blood pressure had risen to 100 mm. systolic.

During the day he was given a transfusion of 75 c.c. of blood. Under sedatives, rest, and restricted fluid he continued to show improvement until the evening. About 5.45 p.m. he vomited twice, almost explosively, and then complained of colicky pain in the left lower quadrant. At this time he was examined by the house surgeon, who discovered very definite resistance and tenderness about an area corresponding to McBurney's point on the left side of the abdomen. His blood pressure dropped from 120 mm. to 104 systolic, and his pulse rose slightly. These symptoms passed off very quickly, and the tenderness had all disappeared by 6.10 p.m. A preoperative diagnosis was made of hæmorrhage from an ulcer in ectopic gastric tissue in a Meckel's diverticulum. It was decided to carry out an exploratory laparotomy and this was performed the following morning under cyclopropane anæsthesia.

After the peritoneum was incised no free fluid was obtained in the peritoneal cavity, although considerable blood was discovered in the distal portion of the small bowel and cæcum. A Meckel's diverticulum measuring about 1½ inches by 1 inch in diameter was discovered about 18 inches from the ileocæcal valve. Palpation revealed no induration or evidence of ulcer externally, but the diverticulum was removed, the incision being made longitudinally and sewn up in a transverse direction. The mucous membrane of the diverticulum appeared intact, but was covered by numerous small elevations of the mucous membrane. These protrusions later turned out to be ectopic gastric tissue. Further exploration of the small bowel revealed a definite perforation about ⅛ inch in diameter, situated on the antimesenteric border of the small bowel, about three feet from the ileocæcal valve. The edge of this perforation was covered with lymph; proximal to the perforation, for a distance of about 4 inches, the small bowel was dilated, and appeared to be abnormally thickened with a sponge-like resistance. This whole area, together with a normal piece of bowel on each side was resected, and an end-to-end anastomosis performed. On opening the small bowel the mucous membrane, which was thrown into numerous longitudinal folds or rugæ, was very suggestive of gastric mucosa. This completely encircled the whole bowel. The perforation which was discovered previously was located at the junction of this abnormal mucous membrane and the normal ileal mucous membrane. Pathological sections of this region showed normal stomach mucous membrane which extended down to the muscularis mucosæ, but there was no change beyond this region. The ulcer was of the ordinary peptic type.

During the operation, the child was given a transfusion of 250 c.c. of blood, and this was repeated later during the day. He made an uninterrupted re-

covery, and was discharged three weeks after admission. Before discharge a barium series of the intestinal tract was taken, which showed a normal outline of the stomach, and no visible abnormalities of the intestines. In the sections taken from the thickened small bowel typical gastric fundal mucosa was found in which the glands showed both chief and parietal cells.

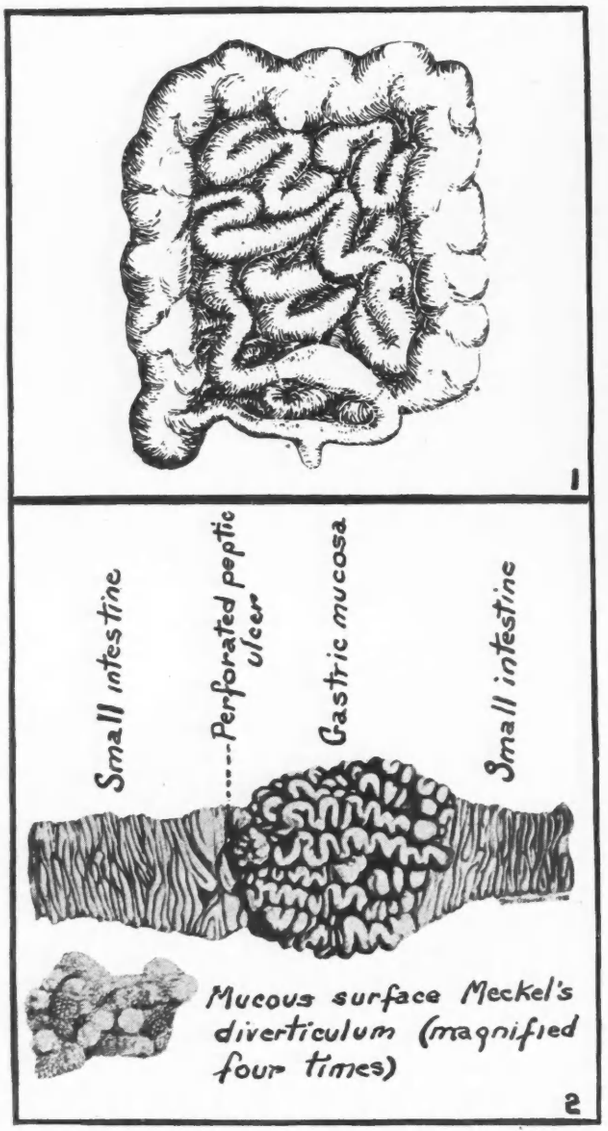

Fig. 1.—Diagrammatic sketch to show relations of intestines found on opening abdomen. M.G.H. No. 3338-38, October 6th, S38-1180 (Dr. Fleet). **Fig. 2.**—Drawing showing gastric tissue with ulcer, and on each side normal intestinal mucous membrane. M.G.H. No. 3838-38, S38-1180 (Drs. Barlow and Fleet).

This is a case of misplaced normal gastric mucosa which is included in the heterotopias of the alimentary tract. Due to some error in development epithelium appears in a situation to which it does not properly belong. The actual cause of the abnormality being unknown, many theories have been advanced to explain the phenomenon.

Albrecht's theory is based on the pluripotential capacity of the cells lining the omphalomesenteric duct and the primitive intestinal tube to develop into any of the glandular structures in the adult intestine or accessory glands, with the ability to retain one of the other potentialities. Schaetz's reimplantation or auto-implantation theory claims that movements of the maternal organism are communicated to the developing ovum and that fragments of potential gastric mucosa are torn loose and reimplanted at physiological narrowings in the intestinal tract. Greenblath regards the presence of heterotopic tissue in the omphalomesenteric duct as the result of retarded normal embryological retrogression. This theory falls into the class of "dysembryoma" which as defined by Pierre Masson is an example of vestigial heterotopia capable of becoming neoplastic (not a neoplasm). Salzer proposed the theory that irritation and inflammation stimulated the endoderm to grow in a manner foreign to that particular region.

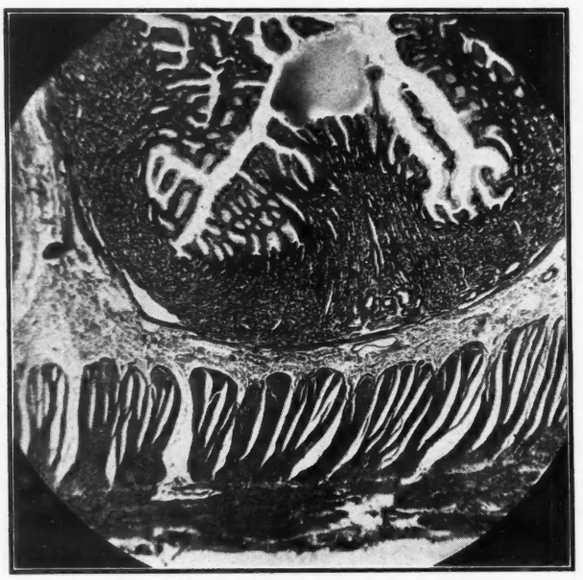

Fig. 3.—Heterotopic gastric mucosa in the ileum.

The endodermal roof of the yolk-sac provides the epithelium for almost the entire digestive system, so that at one time the various divisions from pharynx to rectum are lined by epithelial cells structurally identical. Later a transition occurs which is quite abrupt, differentiating one type from another. The epithelial lining of the stomach has its own histological characters which differ quite clearly from that of the intestine. This transformation of one epithelial type into

another is seen very clearly in the œsophagus. First, the entodermal layer is a simple low columnar epithelium; it then becomes two-layered, and in the ninth week the superficial cells are transformed into ciliated cells; in the 11th week clear vesicle-like, glycogen-containing elements appear between the ciliated cells and soon outnumber them. Later, the glycogen-containing cells are transformed into superficial squamous cells and partly into ciliated cells. Finally, the ciliated cells are greatly reduced in number and are arranged in small patches on the surface of the now stratified squamous epithelium.

If one could discover the stimulus which transforms the original entoderm cells into two distinct forms of epithelium such as is seen on either side of the pyloric ring the explanation of heterotopia would be solved. This same stimulus must be effective in localized areas. Professor Nicholson believes that environment is the main factor producing the changes. If the environment remains normal throughout development the cells finally acquire that form found in normal adult structure. If the environment becomes sufficiently abnormal at some period in the development differentiation occurs in another direction, resulting in a different type of adult cell entirely foreign to this particular segment of gut. In view of the findings in the case reported in this paper where the gastric tissue was found at least 18 inches proximal to Meckel's diverticulum, it must be assumed that there is some other factor besides environment to account for these changes.

Taylor, in an excellent article on epithelial heterotopias of the alimentary tract, divides them into two main groups, congenital and acquired. The acquired are the result of inflammatory lesions associated with ulceration and loss of tissue. Unlike the congenital type they occur in the large bowel as well as in the upper portion of the gut. Two cases were reported in which gastric glands were found in tuberculous granulations of the appendix, and in a tuberculous ulcer of the colon. The congenital type he subdivides into superficial and deep. The latter are those in which the epithelium comes to lie subjacent to the muscularis mucosæ. He gives an excellent list showing how widespread these heterotopias may be and I am taking the liberty of reproducing it.

TABLE

Type of misplaced tissue	*Region affected*	*No. of cases*
(1) Superficial heterotopia	Œsophagus	6
(*a*) Gastric	Duodenum	2
	Small intestine	1
	Meckel's diverticulum	5
	Umbilicus	1
(*b*) Intestinal	Stomach	36
	Umbilicus	3
(*c*) Duodenal	Stomach	1
(2) Deep heterotopia		
(*a*) Submucous glands	Stomach	1
(*b*) Intramural cysts	Stomach	1
(*c*) Adenomyoma	Stomach	6
	Duodenum	3
(*d*) Accessory pancreas	Stomach	6
	Duodenum	7
	Jejunum	3
	Meckel's diverticulum	3

Examination of this table reveals that the most frequent displacement is that of the small intestinal mucous membrane to the stomach. The heterotopic tissue occurs in small isolated depressed areas varying in extent up to an inch or more in diameter. Sections taken from these areas show typical intestinal mucous membrane. The condition is of more than academic interest, for localized areas in the œsophagus and stomach have been mistaken for ulcers. Again the gastric tissue which is commonly found in Meckel's diverticulum may ulcerate, perforate, or give rise to severe massive hæmorrhage.

Taylor reported a case of gastric gland heterotopia occurring in the small intestine about 10 inches from the ileo-cæcal valve and on the mesenteric border. As we know that Meckel's diverticulum may occur on this border as well as on the anti-mesenteric border this may well have arisen in connection with a Meckel's diverticulum. With this exception no reported case of gastric heterotopia in the small intestine beyond the duodenum was found in the literature.

The author would like to express his thanks to the Pathological Department of the Montreal General Hospital for the sections necessary for the publication, and to Miss Mary Gzowski for her excellent drawings.

ON THE EXPECTORANT ACTION OF RESYL AND OTHER GUAIACOLS*

BY W. FORD CONNELL, GRANT M. JOHNSTON AND ELDON M. BOYD

Kingston, Ont.

FEW drugs are more empirically used and less scientifically understood than expectorants. There is no uniformly accepted definition of an expectorant. Presumably, it is generally regarded as a drug which increases the production, or the disposal, or both, of liquid secretions in the respiratory airway. Practically nothing is known, however, about the normal production, composition, control, or functions of liquid secretions in the respiratory airway. It is a field of medical research which has been neglected. A review of the common textbooks of pharmacology and therapeutics reveals a picture of confusion, contradiction, neglect and, in a few instances, a candid admission of the lack of information.

Knowledge of any subject becomes concrete and substantial only as reliable methods of investigation become available. There are few methods used in the study of expectorants which cannot be criticized from one point of view or another. Methods have been devised for the study of disposal of pulmonary secretions, and experiments have been reported on the effect of drugs on ciliary movements, "bronchial peristalsis", cough, respiratory movements, and reabsorption from the lung.[6]

A number of methods have been used to study the production of pulmonary secretions.[3] Rossebach viewed mucus production in the exposed tracheal mucosa. Henderson and Taylor collected secretions in a calcium chloride tube from the trachea of an anæsthetized cat held upside down. Shilf put a calcium chloride tube into the trachea. Vollman compared the dry weight of the lungs with that of the liver after administering expectorants. Since the lining of the respiratory airway is exceedingly sensitive, it appeared that methods involving prolonged exposure, anæsthesia, foreign bodies, and extensive mutilating experiments would probably not yield results analogous to those which obtain in the intact body. We sought a method which would be free of these objections.

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METHOD

It was considered that if a drug increased the production of secretions in the respiratory airway it should be possible to demonstrate at certain intervals the presence of more water in different parts of the respiratory system. By quickly killing an animal at a given interval after administering a drug, quickly dissecting out its lung and finding the water content of the different parts, values should be yielded which would be similar to those in the intact animal. The finding of an increased water content would signify under these circumstances an increased production of liquid secretions containing more water than the tissues from which they came and produced more rapidly than removed. If the drug produced a pathological œdema or congestion this would also register as an increased water content. The finding of a decreased water content would signify the removal of watery secretions more rapidly than formerly produced, or an inhibition of the production of secretions or a vasoconstriction.

When cells begin to secrete more actively they may also receive an increased blood supply which might of itself increase their water content. If this physiological vasodilation remained the same or decreased on ascending through the alveolar, bronchial and tracheal parts of the respiratory tract one might expect to encounter an increased water content on ascending through the same parts, due to an increasing accumulation of secretion within the airway. Such a finding would indicate increased production and excretion of pulmonary secretions. Increased water in the upper respiratory tract with no change or a decrease in the lower tract would indicate, in the absence of vascular changes, an increased excretion of pulmonary secretions only. No change or a decrease in the water of the upper tract with a diminishing water content of the lower tract would indicate decreased produc-

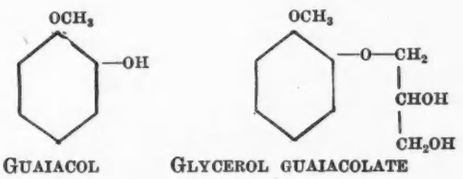
tion of secretions. Increased water in the lower tract with no œdema or congestion and no change or a decrease in the water of the upper tract would indicate decreased excretion of pulmonary secretions.

The method used consisted in measuring the water content of three parts of the respiratory tract, namely the trachea, the proximal part of the lung which consisted of or contained most of the bronchial tissue, and the distal part of the lung which contained mostly alveolar tissue. After examining several species, albino rats were found most suitable for this work and a more detailed account of the technique will be published elsewhere.[1] When any change in water content was encountered the data were supplemented by further histological studies to ascertain the vascular picture. Fortunately, the water content of the normal respiratory tract was found to remain remarkably constant in a given season,[1] and this facilitated detection of relatively slight changes in water content brought about by expectorants.

In this paper we wish to report the effect on pulmonary secretions of guaiacol and several guaiacol derivatives with some clinical data on resyl. Information on the expectorant action of guaiacols is limited. According to Professor Gordonoff, of Berne, Switzerland, who has done most of the recent work on them,[3, 4, 5] guaiacols stimulate excretion of pulmonary secretions.

RESULTS

Most of the experiments were performed on guaiacol and glycerol guaiacolate (Resyl-Ciba) which have the following structure:



GUAIACOL GLYCEROL GUAIACOLATE

Guaiacol is a liquid soluble 1-80 in water, and usually irritant to the stomach; glycerol guaiacolate is a crystalline powder, soluble 1-20 in water, and reported to be almost non-irritant to the stomach.

Clinical data on resyl.—0.1 g. of resyl was dissolved in sweetened water and administered by mouth 4 times a day to 20 patients on the medical service of the Kingston General Hospital. These included patients with cough associated with acute bronchitis, bronchitis with asthma and chronic pulmonary fibrosis. Through the courtesy of Dr. Bruce Hopkins, the drug was also administered to a dozen patients suffering from chronic pulmonary tuberculosis in the tuberculosis section of the isolation hospital. Without exception the drug was shown to be free of any unpleasant side-effects. A few patients reported no subjective improvement, but the great majority of both tuberculous and non-tuberculous patients noted that expectoration was easier and freer, and that useless, irritating cough was greatly diminished. These results were most striking, as would be expected, in conditions of acute bronchitis with dry, irritating cough. In a number of patients with tuberculosis receiving the drug the beneficial effect obtained with the dose noted above appeared to last only about one week. Further work is being done in these latter cases with increasing doses.

Laboratory data.—Guaiacol and glycerol guaiacolate were dissolved in saline to 0.2 per cent or less and injected intraperitoneally into albino rats in doses of from 0.066 to 6.6 mg. per kilo (*i.e.*, up to the minimal oral dose of guaiacol of the British Pharmacopœia, 1932, per equivalent weight). All of the doses of both guaiacol and glycerol guaiacolate had the same effect on lung water. Hence a summation curve representing the changes in the water content of the entire respiratory tract produced by the injection of guaiacol and glycerol guaiacolate into a total of 141 white rats was prepared and is shown in Fig. 1. It will be seen that the injections produced an immediate increase in lung water during the first hour and that this increase was more or less sustained for 3 days and returned to normal on the 4th day. In a control group of 72 rats similarly injected, but no guaiacol or glycerol guaiacolate given, there were no appreciable variations from the initial water content.

Statistical significance.—It will be noted in Fig. 1 that the absolute increase in lung water was not marked. This fact became obvious early in these researches, and it emphasized that if the difference were to be proved significant large numbers of both drug-treated and control rats would be necessary, and that the distribution of results in both groups must be within narrow limits. For statistical purposes the changes in lung water between 1 hour and 3

days after injection may be considered together and the entire group compared with the controls using the statistical formulæ of Davenport and Ekas.[2] A summary of this analysis is presented in Table I in which it is seen that the co-efficient of reliability of the mean increases in lung water produced by these drugs is in both cases greater than 2, which is the minimal value indicative of a reliable mean difference.

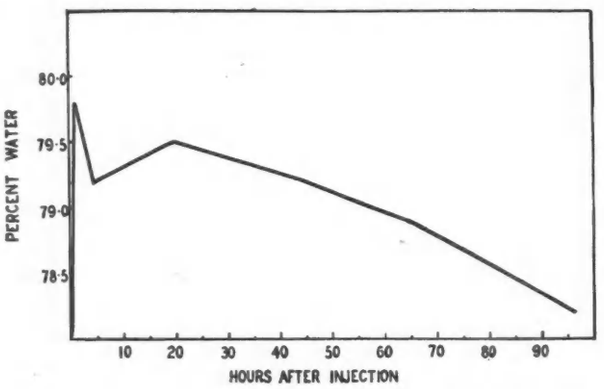


Fig. 1. — The effect of guaiacol and glycerol guaiacolate (resyl) on the water content in grams per 100 g. of rat respiratory tract. The line is drawn through means of 10 to 34 rats each.

TABLE I.

THE STATISTICAL SIGNIFICANCE OF THE INCREASE IN RESPIRATORY TRACT WATER PRODUCED BY INJECTION OF GUAIACOL AND GLYCEROL GUAIACOLATE.

Drug administered	*Mean increase in water*	*Coefficient of reliability of mean increase*
	(g./100 g.)	
Guaiacol	1.1	3.4
Glycerol guaiacolate	1.4	4.5

The effect on lung fractions.—The mean increase in water, in g. per 100 g. of each fraction of the respiratory tract has been given in Table II. Both drugs increased most markedly the water content of the trachea and both of the increases in tracheal water were calculated to be statistically significant. Variable and smaller changes in the water content of the bronchial and alveolar parts of the lung were also recorded with none of them statistically significant.

TABLE II.

THE MEAN INCREASE IN WATER CONTENT OF FRACTIONS OF THE RESPIRATORY TRACT AFTER INJECTION OF GUAIACOL AND GLYCEROL GUAIACOLATE.

	Increase in water (g./100 g.)		
Drug administered	*Trachea*	*Alveolar part*	*Bronchial part*
Guaiacol	3.3	0.7	0.0
Glycerol guaiacolate	3.5	0.0	0.7

Both guaiacol and glycerol guaiacolate thus increased the water content of the trachea with either no change or small increases in the water content of the lower respiratory tract. The lung parenchyma of these rats appeared pinker than normal, and histological sections revealed an increased blood supply. The trachea was, however, of normal colour and of an unaltered appearance, histologically. These changes agree with the conclusion that these drugs act as "excretotropic" expectorants, a term which we use to designate increased excretion of pulmonary secretions. The marked increase in lung water within the first hour after injection also agrees with this conclusion. A curve for the tracheal water, similar to that in Fig. 1 for whole respiratory tract water, revealed an even more marked increase in the first few hours after injection. However both the trachea and the whole respiratory tract contained increased amounts of water for three days after injection of the drugs. This long duration of the reaction would suggest that in addition to acting as excretotropic expectorants, guaiacol and glycerol guaiacolate also act as what we may call "secretotropic" expectorants, stimulating the production of pulmonary secretions which are removed as quickly as produced. Gordonoff's observations were presumably made only within the first few hours after giving the drugs[3, 4, 5] in which case he may have missed the evidence upon which we base our conclusion that these drugs may also be secretotropic expectorants. Our evidence suggests, therefore, that guaiacol and glycerol guaiacolate act both as secretotropic and excretotropic expectorants.

Guaiacol carbonate, N.F.—Guaiacol carbonate is not a pharmacopœial drug but has been recommended as a substitute for guaiacol because it is tasteless. It is almost insoluble in water. To investigate its expectorant action, it was dissolved in olive oil and injected in the same manner as guaiacol with controls injected with an equivalent volume of olive oil alone. Equivalent doses of guaiacol carbonate were found to have the same effect on the water content of the trachea and lungs as had guaiacol and glycerol guaiacolate. It may be concluded that guaiacol carbonate is also a secretotropic-excretotropic expectorant.

Potassium guaiacolsulphonate, N.F. — Potassium guaiacolsulphonate is also recommended as a tasteless expectorant, soluble in water. Chemically it is different from the carbonate of guaiacol and glycerol guaiacolate which may be regarded as phenolic ethers; potassium guaiacolsulphonate contains a sulphonic group substituted for one of the hydrogens in the benzene ring. It also appears to differ pharmacologically from the other two guaiacols. As long ago as 1903, Knapp and Suter[8] and others pointed out that this compound in moderate doses was inactive pharmacologically. It appears to be quickly excreted unchanged in the urine and not to be converted into guaiacol in the body since it does not lead to an increased urinary output of ethylsulphonates and glycuronates, the usual excretory combinations of guaiacol. More recently, Gordonoff and Wyss[7] have shown that guaiacol does not appear in the lungs after giving potassium guaiacolsulphonate, while it does after guaiacol, guaiacol carbonate and guaiacol glycerol ether; they concluded that it had no expectorant action like that of the other three compounds.

Our conclusions correspond with those of the European investigators, as we have been unable to demonstrate any change in the water content of the respiratory tract of rats following the injection of potassium guaiacolsulphonate. From evidence at present available, it would appear that this compound has no place in the therapeutic armamentarium.

SUMMARY

By measuring the water content of different parts of the respiratory tract, supplemented where necessary by histological studies, a method has been offered for the study of expectorant action.

Clinically, Resyl-Ciba has been found to be a guaiacol which does not disturb digestion and which effectively aids expectoration and ameliorates cough.

Experimentally, guaiacol, guaiacol carbonate and glycerol guaiacolate (resyl) were found in white rats to increase significantly the water content of the trachea and this increase lasted over a period of 3 days from the time of administration. In conjunction with the absence of histological changes in the trachea, this evidence is offered as indicative of both an excretotropic and secretotropic expectorant action by these compounds.

On the other hand, potassium guaiacolsulphonate was found to be inactive.

REFERENCES

1. BOYD, E. M. AND JOHNSTON, G. M.: Seasonal variation in the water content of the respiratory tract, *Am. J. M. Sc.* (in press).
2. DAVENPORT, C. B. AND EKAS, M. P.: Statistical Methods in Biology, Medicine and Psychology, New York, 1936.
3. GORDONOFF, T.: Die Expektoration, ihre Physiologie und pharmakologische Beeinflussung, *Wien. klin. Wchnschr.*, 1934, **47**: 137.
4. *Idem*: Physiologie et pharmacologie de l'expectoration, *Ann. et Bull. de la Soc. Roy. des Sc. Nat. et Méd. de Bruxelles*, 1937, **7-8**: 173.
5. *Idem*: Die Expectorationsvorgang und seine pharmakologische Beeinflussung, *Wien. klin. Wchnschr.*, 1938, **51**: 289.
6. GORDONOFF, T. AND LEHMANN, G.: Ueber die Beeinflussung der Resorptionsfähigkeit der Lunge durch Expektorantien, *Zeit. f. d. ges. exp. Med.*, 1936, **99**: 731.
7. GORDONOFF, T. AND WYSS, W. J.: Ueber das Kaliumsulfoguaiacolicum, *Zeit. f. d. ges. exp. Med.*, 1934, **92**: 169.
8. KNAPP, T. AND SUTER, F.: Experimentelle Untersuchungen über die Resorptions- und Ausscheidungsverhältnisse einiger Guaiacolderivate, *Arch. f. exp. Path. u. Pharmakol.*, 1903, **50**: 332.

BRONCHIAL CANCER MIMICS MANY DISEASES. — Cancer of bronchial origin "like the devil, can appear in any shape or form", that is, it mimics many diseases. Because of the danger that such cancer may go unrecognized the respiratory passages of every patient with obscure chest symptoms should be examined by means of the bronchoscope and x-ray. Some of the disorders or symptoms complained of by their twenty-three patients diagnosed as having bronchial cancer were: hæmorrhage, pain on swallowing, difficult and laboured breathing, pain in the chest, productive cough, fever, hoarseness, and pain in some remote part (hip, groin or spine) because of spread of the cancer. All of these are symptoms frequently attributed to ailments far removed from cancer. Nine of the twenty-three patients also had a history of a complicating infectious disease. The mimicking symptoms of these cancers are dependent on the location of the growth, which may either displace or create pressure on an internal organ, thus producing the symptoms which are so misleading. The possible contributing causes of bronchial cancer are chronic inflammatory conditions, the inhalation of irritating substances, and a hereditary susceptibility.—E. L. Jenkinson and A. F. Hunter, in *J. Am. M. Ass.*, 1939, **113**: 2392.

TOXIC GOITRE: THE PRESENT STATUS OF TREATMENT*

BY WILLARD O. THOMPSON

Chicago, Ill.

THERE are three ways of treating patients with toxic goitre: (1) by subtotal thyroidectomy, after suitable preparation; (2) by medical measures alone, including iodine; (3) by roentgen ray therapy of the thyroid.

In most instances treatment by medical measures alone is not satisfactory. It is true that in a few mild cases, either before or after operation, the disease may be held in check by iodine until it disappears. However, the disease appears to run a certain course independent of the administration of iodine, and mild cases may become severe ones, thereby increasing the risk of operation. The outcome of roentgen ray therapy of the thyroid is uncertain, and several months must usually elapse before its effectiveness can be determined. In patients who have the disease in very severe form it may sometimes be of value in improving the pre-operative condition of the patient.

In the past few years we have learned a great deal about the interrelations of the pituitary and the thyroid. By administering the thyrotropic factor from the pituitary we can produce in man a syndrome resembling toxic goitre and can increase the severity of toxic goitre if it is already present. Clinically, we sometimes see hyperthyroidism secondary to hyperpituitarism in patients with acromegaly. Up to the present time, however, attempts to cure toxic goitre by irradiation of the pituitary have not yielded satisfactory results in most patients.

The best method of treating toxic goitre, therefore, remains subtotal thyroidectomy after suitable preparation. This means the intelligent combination of medical and surgical measures. Since iodine was introduced by Plummer in 1922 our point of view with regard to the management of toxic goitre has slowly undergone modification, and it is the purpose of this paper to outline the best method of managing patients with this disease. The object of treatment is to reduce the mortality from thyroidectomy to the lowest possible level. As in any surgical procedure, there are two factors which determine the outcome. One is the condition of the patient and the other is the skill of the surgeon. Of these two factors the condition of the patient appears to be the more important. This is illustrated by the fact that during the six-year period, 1932-37, three of the best surgeons at the Cook County Hospital in Chicago had 5 deaths in performing 222 thyroidectomies for Thompson and Taylor[1] (a mortality of 2.3 per cent), whereas the same three surgeons had 22 deaths in performing 297 thyroidectomies for other medical men (a mortality of 7.4 per cent). The patients in both groups were unselected, but in the first group special care had been taken in pre-operative and post-operative care. Surgical skill is, of course, very important, as the records of individual surgeons clearly show. It would be easy to cite examples of unnecessary complications developing after operation by unskilful men.

GENERAL PRE-OPERATIVE PREPARATION

The following factors are important in preparing the patient for operation.

1. *The administration of iodine.*—Within very wide limits, the size of the dose and the form in which it is administered are not important. For practical purposes 5 minims of Lugol's solution three times daily or 1 grain of sodium or potassium iodide twice daily appear to be adequate doses. It is wise to determine the level of basal metabolism during rest before the administration of iodine is started so that the response to iodine can be gauged accurately. No longer do we follow the old dictum of operating as soon as the basal metabolism shows a maximum reduction, namely, in from 7 to 10 days after starting iodine. We usually wait at least a week after the maximum reduction has occurred and in some instances much longer than this. The danger of the disease itself becoming rapidly worse after the initial reduction in basal metabolism (although the metabolism may rather promptly show some increase) has been exaggerated. Each patient must be regarded as an individual problem and operative procedures

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postponed until it seems probable that the patient can stand them.

2. *Rest.*—The patient should be prepared for operation in the hospital, but rest should not be complete except in the presence of a crisis or cardiac decompensation. Preservation of muscle tone by a moderate amount of activity is a very important part of the treatment. Patients should be encouraged to remain in bed a large part of the day but no definite restrictions should be placed upon their activity. They should be prepared in the hospital rather than at home in order to provide freedom from the wear and tear of their daily routine. Moreover, they should be prepared on the medical and not on the surgical services. Every now and then when I enter the wards of a hospital I find a patient with exophthalmic goitre chafing under the rigid rule of complete bed rest and somewhat irritated by a coiled rubber tube over the heart through which ice water is circulated. This is supposed by some magic process to slow the heart and thereby improve the condition of the patient. A dark room and complete restriction of visitors also helps to make very mysterious what should be a comparatively simple procedure. It is probably much more helpful psychologically for patients to see many of their hospital neighbours undergo thyroidectomy in an uneventful manner.

3. *High caloric diet.*—The diet must be sufficiently high in calories to produce a gain in weight. This means for most patients with toxic goitre a diet of from 4,000 to 5,000 calories. The routine high caloric diets of most hospitals are inadequate for this purpose as they contain only about 3,200 calories on the average. It is necessary to devise a special high caloric diet for goitre patients, which should be high not only in calories but also in protein, because of the excessive loss of nitrogen in toxic goitre. A very simple way to increase the caloric value of a diet is to give feedings of cream between meals. The importance of the diet may be gauged by the fact that gain in weight is the single most important factor in determining the risk of operation.

4. *Roentgen ray therapy of the thyroid.*—When the disease remains unusually severe in spite of the measures outlined above, roentgen ray treatment may sometimes be of value as a method of improving the pre-operative condition of the patient. Following each roentgen ray exposure of the gland there is a temporary reaction with an increase in the severity of the disease, making it important not to give treatments more frequently than once a week. The dose commonly used is 300 roentgen units at a distance of 50 cm., applied on alternate weeks to each lobe and part of the isthmus until a total of from 8 to 12 treatments has been given. The dose must be adjusted for each patient, depending upon the initial severity of the disease and the reaction to treatment. If the disease is present in a very severe form the initial doses should not exceed 100 roentgen units each. Because of some reaction in the tissues of the neck, it is unwise to carry out operative procedures until three weeks have elapsed from the time of the last treatment.

5. *Administration of digitalis* is often of value in patients with auricular fibrillation and cardiac decompensation. However, the administration of digitalis should not be started in the post-operative period.

The single most important favourable sign in predicting the outcome of operation is a gain in weight. With a well marked gain in weight there occurs a reduction in emotional instability and an increase in muscle strength, which have been stressed by Mayo and Plummer[2] as important indexes of the risk of operation. Reduction in basal metabolism during the administration of iodine, absence of upper respiratory infection and of cardiac decompensation are also favourable signs. A high metabolism in spite of iodine may often be disregarded, provided the patient is eating well and gaining weight steadily. A patient with a metabolism of plus 20 per cent may be a poorer operative risk than another with a metabolism of plus 70 per cent. It is, however, a good general rule to proceed cautiously whenever the metabolism is plus 60 per cent or higher in spite of the administration of iodine. Nausea and loss of appetite must be regarded with the gravest concern in any patient with toxic goitre and always contraindicate operative procedures. They are usually indications of an impending crisis, which sometimes can be aborted by the use of roentgen-ray therapy. In some patients with excessive muscle weakness or emotional instability unconsciousness or a toxic psychosis may develop. Under these circumstances duodenal feeding and the intravenous administration of 5 per cent dextrose in normal salt solution may be life-saving

measures. The usual dose of iodine should be administered through the duodenal or intravenous tube.

For some peculiar reason patients with toxic goitre seem very susceptible to upper respiratory infections. These must be watched for with the greatest care and operation never carried out until at least two weeks have elapsed after an infection has cleared up.

A thyroidectomy is always contraindicated when the disease is increasing rapidly in severity, and, usually, when cardiac decompensation is present. It is important to remember that a thyroidectomy is never an emergency procedure and when done as such often results in the death of the patient. A crisis in the post-operative period usually means inadequate pre-operative preparation.

A word should be said about the relation between toxic goitre and foci of infection. While it is true that an acute infection of any kind may aggravate the disease, any attempt to eradicate foci of infection before carrying out a thyroidectomy is very bad treatment. The removal of infected tonsils and teeth and the drainage of infected sinuses usually have no beneficial effect on the course of toxic goitre, and may precipitate a serious crisis.

IMMEDIATE PRE-OPERATIVE PREPARATION

It is important (1) to make a careful search for an upper respiratory infection or a sudden increase in severity of the disease just before the patient goes to the operating room; (2) to administer a carbohydrate meal from 6 to 8 hours before operation. This may consist of oatmeal, sugar, orange juice, toast and milk; (3) to administer the regular dose of iodine with this meal; (4) to institute, at least 24 hours before the scheduled time of operation, some program suitable for the control of emergencies in patients in whom the disease is complicated by diabetes.

As a result of careful preparation the thyroidectomy may be carried out in most patients in one stage, although if there is any question about the strength of the patient the operation should be done in at least two stages. Ligations are almost never used at the present time. In rare instances they may be of value in determining the ability of the patient to withstand operative procedures. If adequate preparation is carried out as outlined above practically all of the complications of operation are purely surgical. At the Cook County Hospital, where we have been making a special effort to reduce operative mortality, we have not had a single death from a crisis since 1934.

CHOICE OF ANÆSTHETIC

The prolonged period of recovery and excessive vomiting from ether make it an undesirable anæsthetic for patients with toxic goitre. Nitrous oxide and oxygen often work well when combined with local anæsthesia, but the two anæsthetics of choice would appear to be ethylene and cyclopropane. Both have the advantage of rapid induction of anæsthesia and rapid recovery. Cyclopropane has the advantage over ethylene of permitting the use of a higher concentration of oxygen, and appears to cause less post-operative vomiting. It must be used, however, only by experienced anæsthetists.

IMMEDIATE POST-OPERATIVE TREATMENT

It is important, immediately after operation, (1) to observe the wound carefully for early detection of excessive bleeding; (2) to observe the patient carefully in order to detect respiratory difficulty as soon as it arises, either from laryngeal or tracheal obstruction. Paralysis of one vocal cord usually does not produce serious respiratory difficulty; (3) to have the services of a specially trained nurse who will report difficulties as soon as they arise; (4) to have facilities on the ward or in the patient's room for the emergency passage of a life-saving tube and performance of a tracheotomy; (5) to administer intravenously 5 per cent dextrose in normal salt solution for prolonged or excessive vomiting, a thyroid crisis, or circulatory collapse. When a thyroid crisis is present the continuous intravenous administration of fluid for several days may be a life-saving measure. As a rule the fluid should be given at the rate of 4 litres in 24 hours, but if the intoxication is unusually severe, it may be given at the rate of 6 in 24 hours. It should be emphasized that if patients are properly prepared most of them do not require the administration of fluid post-operatively by the parenteral route; (6) to adminster iodine to control any residual thyrotoxicosis. Iodine has no effect on the secretion of the thyroid after it leaves the gland, but since it is impossible to predict in what patients the disease will persist after operation it is necessary to administer iodine routinely until the time of

discharge from the hospital. There is no point in giving it beyond this period because it does not prevent either the persistence or recurrence of the disease; (7) to search for parathyroid tetany on the second to fourth post-operative days and control it with suitable measures if observed.

Patients should get out of bed at the earliest possible moment. We rarely keep them in bed more than 48 hours after operation, and often allow them bathroom privileges at the end of 24 hours. It must be remembered that the operative procedures involve the neck, and that getting patients out of bed causes no undue strain on any group of muscles. By getting patients out of bed early we prevent them from becoming bedridden and losing their muscle tone, the post-operative course is much shorter, and the convalescence appears to be milder.

As a result of applying the principles outlined, Thompson, Taylor, Meyer and McNealy have been able to reduce the mortality from operation for toxic goitre at the Cook County Hospital, Chicago, from about 10 per cent to about 1.5 per cent.

After Discharge from the Hospital

The care of patients with toxic goitre does not end with discharge from the hospital. They should be observed periodically to detect any complications that may arise. In about 70 per cent the basal metabolism drops to within normal limits and remains there indefinitely. In about 20 per cent a mild or moderate depression of the metabolism is observed. In 1 or 2 per cent marked myxœdema develops; and in from 5 to 10 per cent there is persistence or recurrence of toxic goitre. True recurrences are rare but may be noted at any time during the remainder of the patient's life. They can be detected only by having an adequate follow-up program.

Summary

The best method of treating toxic goitre is by subtotal thyroidectomy after suitable preparation.

The most important factor in determining the outcome of operation is the pre-operative condition of the patient.

The most important favourable sign in gauging the risk of operation is gain in weight.

A crisis in the post-operative period usually means inadequate pre-operative preparation.

Patients must be followed very carefully in the immediate post-operative period to prevent deaths from purely surgical complications, such as excessive bleeding and sudden respiratory difficulty.

Other factors in the pre-operative and post-operative care are outlined.

References

1. Thompson, W. O., Taylor, S. G., Meyer, K. A. and McNealy, R. W.: Experiences in treating toxic goiter in a large public hospital, *Ann. Int. Med.*, 1938, 12: 217.
2. Mayo, C. H. and Plummer, H. S.: The Thyroid Gland, St. Louis, C. V. Mosby Co., 1926, part 2.

THE TREATMENT OF PAINFUL FEET*

By Geo. W. Armstrong

Ottawa

IN childhood one of the earliest and commonest conditions which we meet is that of congenital flat foot. The child is brought because he complains to his mother of pain in his feet and legs after he has been playing. On examining the child we find that he has long, thin, flat feet, and that the location of the pain is in the arch of the foot and along the tibial muscles. On further enquiry we find that the father also had flat feet. He comes from a well-to-do family, a family in which the feet are not the primary essential in the earning of the living. There is a definite hereditary factor.

Treatment must be directed toward the development of the muscles of the feet and legs. It is usually found that if the line of weight-bearing is corrected the child will take care of the exercise himself. Frequently an orthopædic heel is all that is required. Sometimes further tilting of the foot is necessary. This is obtained by inserting an inside lift under the ball and heel of the shoe, and advancing the counter under the arch. The counter, as you all know, is the stiffening in the sides of the shoe at the heel. This causes the child to correct his gait, and even to walk pigeon-toed, which may worry the mother. If the child is co-operative exercises can be carried out to

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advantage. Our best aid is a masseuse if the doctor has not time to direct the exercises himself. The procedure really consists in developing the tibialis anticus and posticus and the short flexors of the toes. In New York congenital flat foot has become so serious a problem that many of the clinics believe a mid-tarsal arthrodesis is not too radical a method of treatment.

The second problem in childhood is that of ill-fitting shoes. If the shoes are too short the child complains of pain along the dorsal aspect of the proximal two-thirds of the 1st and 2nd metatarsals. The pain begins during the latter part of the day, and by evening he also has pain in the calves of the legs. On observing his shoes it is noted that the line of weight-bearing is normal, but the sole is worn off at the toe. On removing the shoe, and slipping one's hand into the toe, with the palm upward, it is found that the lining has been worn out from pressure of the great toe, and at the heel the lining has worn out over the counter on either side. Examination of the child shows a slight redness of the end of the great toe after he has stood barefooted for five or ten minutes, because of nature's desire to compensate for the circulation impaired by the pressure. There is no other abnormality of the feet. On further questioning the boy we find that he obtains relief by removing his shoe, and usually spends the evening in his bed-room slippers.

Proper fitting shoes are important. Too much confidence cannot be placed in the commercial fluoroscope, because of the inability of the people operating them to interpret correctly what they see. It is necessary that the child should go to the store to be fitted, and not have a pair of shoes sent to him. This, I find, is necessary to impress upon patients. Secondly, the child's foot should be measured in the standing position, both in regard to length and width. If these two principles are adhered to, much should be accomplished to eliminate painful feet in children.

Along with this condition one may find hammer-toes or an epiphysitis of the heel. The latter is an inflammation of the epiphysis of the os calcis. One must also bear in mind Kohler's disease, which is a nutritional disturbance of the tarsal scaphoid. This condition sometimes affects the head of the 2nd metatarsal. It has a definite radiological picture, and practically always responds satisfactorily to rest. If there is any doubt about the clinical diagnosis x-rays should be taken.

The number of men who present themselves because of painful feet is relatively small. Between the ages of 15 and 30 there are practically none. After the third decade a few begin to feel the strain of physical exertion and of ill-fitting shoes. The former is usually evidenced by pain beneath the head of the second metatarsal. It is a result of standing or walking on terrazo floors or cement pavement while wearing thin socks and thin-soled shoes. It is relieved by substituting thicker soles and heavier socks, and sometimes by attaching a metatarsal bar.

Occasionally a man complains of pain beneath the longitudinal arch, resulting from fatigue of the tibial muscles. For several years I used a Whitman plate to relieve this condition, but discarded it because the average patient would not wear it for more than a year. In its place I have come to use a shoe with an orthopædic heel and advanced counter, sometimes adding an inside lift of 1/16″ or 1/8″ to heel and ball or to the heel alone as the occasion demands.

A short shoe over a period of years results in a flattening of the articular surface of the head of the 1st metatarsal with accompanying limitation of dorsiflexion, technically called a hallux rigidus. It is best relieved by a metatarsal bar attached to a shoe with a thick sole and a soft upper. The shoe, of course, must be of adequate width.

Some men, usually around the age of fifty, come to us because of pain in the heel, with some plantar tenderness. This tenderness is greatest at the insertion of the plantar fascia, and it is aggravated by direct pressure or by tension of the plantar ligament. X-ray may show a bony spur. This condition can usually be relieved by inserting a felt pad in the heel of the shoe, and cutting out a very small hole over the point of tenderness. Sometimes two layers are necessary. In my own office I use a thick, soft, white felt, sold by one of our surgical supply houses. It is sometimes necessary to remove the spur, but I have not done this now for several years. If such an operation is performed the patient is obliged to stay off his feet for many weeks, and in fact sometimes for several months. I have found with the vast majority of these patients the same result can be obtained by keeping them off their feet without operation. In fact, very

few of them need any further treatment than the felt pad.

Congenital idiopathic pes cavus is another condition that sometimes gives trouble to a workman. It is treated with a metatarsal bar or an accurately fitted metatarsal plate. This is practically the only instance in which I now use a metatarsal plate or arch-support in the shoe. In rare instances operative procedure is necessary. This is done by severing the posterior attachment of the plantar fascia, and by flattening the angle formed between the os calcis and the metatarsals. The correction is maintained by fusing the mid-tarsal joints.

I purposely avoid the discussion of painful feet associated with fractures of the tarsal and metatarsal bones, except to mention that a fracture of the neck of the second metatarsal does occur during strenuous or rough walking without any history of accident. It is sometimes called a "march" foot. There is usually no displacement. It is treated as any other fracture of the metatarsal.

We now come to the third group of our patients, which constitutes by far the greatest proportion. Probably 90 per cent of people with foot trouble are women between the ages of twenty-five and fifty-five. A few young women come during the early part of their training as nurses because they have been unaccustomed to standing and walking for such long periods during the day, and some because they have been ill-advised in the type of shoe which they are wearing. In many sections of this country it is called acute flat foot. A better term would be acute foot strain or fatigue. Treatment of this condition is rest during the acute stage, supplemented by warm baths of normal saline to relieve the ache and improve the circulation. If the mechanical structure of the foot is incorrect proper balance should be obtained by desirable shoes. Adhesive strapping is only a temporary measure, to be used if the patient cannot stay off her feet or if proper shoes cannot be obtained immediately.

A certain number of women have pain in the feet from an arthritic back-ground, simply a manifestation of a generalized disease. Careful examination usually localizes the pain in one or several of the joints of the foot. It has been my experience that people are relieved to the greatest extent by supplying them with a loosely fitted Oxford with a medium heel and a flexible arch. Rigidity in the shank of the shoe merely aggravates the pain in the mid-tarsal joint. It acts as a direct irritant to the acute inflammatory process. Treatment, of course, must be directed toward general eradication of the disease. Locally, rest, relief from irritation, and again warm saline baths, give the patient the greatest immediate and also the most lasting comfort.

Finally, we come to that woman who suffers from the multiplicity of disorders inflicted by the shoe which our civilization and stylists dictate that she must wear. Because she represents probably 75 per cent of all people who come to us because of painful feet I feel that this matter should be discussed in detail. The woman of questionable age, who, because of family, social or economic necessity has to be on her feet a good deal of the day, comes complaining of pain over the medial aspect of the 1st metatarsal phalangeal joint, pain beneath the ball of the foot with burning of the toes, accompanied by pain in the calves of the legs, later pain up the sides of the thighs, and finally pain in the lumbar region of the back. So many of these patients say the same thing—"I really should apologize for coming to you because of such a trivial matter but I am nearly desperate. I must obtain relief for my feet or I shall have to give up my job. I have gone to the best shoemakers who have been recommended. I have been to several chiropodists. During the past month I have been going to a chiropractor, and finally I enquired at the office if anyone knew of a medical doctor who treated feet." These few introductory remarks of the patient I always feel are a direct challenge to the medical profession. Some continue their remarks by telling me the type of shoe they will or will not wear. My direct reply is that I sympathize with them very keenly. They are absolutely the victims of circumstance. I assure them it is my desire that they should continue at their normal occupation if it is at all possible, and that the type of shoe that I would ask them to wear will be along normal lines if possible, but the first necessity is that the true cause of their foot pain be discovered. Finally, and I resort to this only with those who are unreasonable, I tell them that unless they are willing to carry out my instructions in every detail there is no use commencing

treatment under my direction. That usually brings a pause in the conversation: it sometimes ends the consultation, with the not uncommon result that I receive a telephone call the following day to ask for a second appointment. When the discussion is resumed I relate to the patient the clinic that was given to me by a shoemaker regarding the proportion of weight-bearing between the ball and the heel of the foot. I have no scientific data to prove the facts which he has set forth, but he was undoubtedly theoretically sound. When a person stands in his bare feet 60 per cent of his weight is carried on the heel. When the heel is raised 1 inch weight-bearing is distributed equally between the ball and the heel of the foot. If it is raised another inch 70 per cent of the weight-bearing is transferred to the ball of the foot. Therefore, if the patient has come complaining of pain beneath the heads of the metatarsals this is the first error that should be corrected. The second factor is that of wearing a rigid-shanked shoe. Regardless of its design, it limits motion in the foot to the metatarsal phalangeal joint. Thirdly, the average woman who comes complaining of foot trouble is wearing a shoe that is too small for her, either in length or width, or probably both. Finally, it is difficult, and sometimes impossible, to determine how many of the symptoms of this patient are the result of the alterations which have been worn in her shoes and how many are primarily due to improper weight balance. The patient is told that her trouble has not come on over night, that it has taken years to reach the present stage, and it will take weeks and even months to obtain relief. In the first place I ask her to obtain an Oxford with a heel of medium height and a flexible arch. This must be fitted according to my instructions. I inspect the shoes before they are worn; usually having two or three or even half a dozen pairs sent to the office for trial. This brings the second argument, but, usually, by taking a firm stand, and with kindly suggestions, leaving the matter entirely with the patient to accept or decline the advice given, it is agreed to try out the suggested shoe. If a satisfactory fit cannot be obtained in a ready-made shoe, which rarely occurs, the patient is referred to a shoemaker.

This Oxford is worn usually for one month without alterations. Simply correcting the weight balance, with sufficient width in the ball of the foot, is usually all that is required. The patient is instructed not only to bathe but to soak the feet in normal saline, one teaspoon of salt to each pint of water, for one-half hour at least twice a day, and in acute conditions when the patient has been taken off her feet this should be used every four hours. A pad is placed around but not over the corns and bunions, and is cut from white felt to suit the occasion as it arises. The average corn pad that is sold commercially has too large a hole and too little felt. After soaking the feet daily the callosities can generally be elevated with the finger or thumbnail. Any loose material may be clipped away with scissors that have been boiled. No paring with a razor blade is permitted. If, at the end of one month, pain beneath the ball of the foot is still severe a metatarsal bar is attached to the shoe. If, on the other hand, improvement is satisfactory the patient is advised to get a second pair of shoes of exactly the same type as the first. This permits one pair of shoes to dry thoroughly while the patient is wearing the other. It certainly requires more than eight hours to dry out a pair of shoes. If one pair is placed upon a pair of shoe-trees at midnight they can be left there until the morning of the second day. In other words, the shoes are worn for sixteen hours, and allowed thirty-two hours to dry. By so doing the patient not only obtains foot comfort but also shoe economy.

At the time the second pair of shoes is obtained the patient usually enquires how long it will be before she can wear a dance slipper or an ordinary pump. She is told that as long as she will wear the shoes that have been advised during her hours at work, and can carry on with her work, one really cannot interfere with her social life. It is just as impossible for a woman to wear an Oxford with an evening dress as it is for a man to wear a red tie with a dinner jacket.

It will be noticed that in all this discussion there has been no reference to the use of arch supports, the excision of corns, or the use of ointments or drugs in the treatment of callosities. X-ray therapy is sometimes resorted to in the treatment of verrucæ on the soles of the feet but for practically no other condition.

Bunions used to present a large problem but in the community in which I live they are be-

coming much less common, probably as a result of the custom among our shoe merchants of fitting the shoes longer.

The treatment of bunions may be divided into three phases. First there is the bursitis which responds to relief of pressure and hypertonic saline baths. The second stage is that of moderate exostosis of the head of the metatarsal with or without bursitis, requiring removal of the excrescence without interference with the joint. The third and most severe group is that with marked valgus deformity, necessitating surgical correction. The operation which I have found to be by far the most satisfactory is that of resection of the proximal half of the proximal phalanx, with removal of the exostosis from the medial aspect of the head of the metatarsal. This procedure is used extensively in Liverpool and Birmingham. It produces a uniformly good result and enables the patient to return to his occupation at much the earliest moment of any surgical procedure.

In conclusion I would point out that in the alleviation of foot discomforts treatment should be as simple as possible, relieving the fundamental causes of the discomfort, and at the same time effecting return to normal by observing simple physiological principles.

ACTINOMYCOSIS*

BY H. S. MORTON, M.B., F.R.C.S.(ENG.)

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BECAUSE actinomycosis is rarely diagnosed, it is considered a rare disease. The result of such a conception is the missing of many cases, and an understanding of the disease which now lags far behind that of the other chronic granulomata.

Historically it may be considered to be as old as a fossil rhinoceros, in which sinus tracts in the jaw were deduced to be due to actinomycosis.[1] Although several isolated cases were reported before 1877, it was not until that year that Bollinger and Harz[2] isolated the organism from the jaw of an ox, and named it the "ray fungus" because of its radiate appearance. Wolff and Israel[3] cultivated the organism anaerobically in 1891 from a human case. The first human case recognized in Canada was under the care of the late Dr. James Bell,[4] at the Royal Victoria Hospital, Montreal, in 1900. Here Dr. A. G. Nicholls, then assistant-pathologist to the hospital, was able to demonstrate the fungus in scrapings from a persistent lumbar sinus of previously obscure origin. In 1902 Lignières and Spitz,[5] in the Argentine, found and differentiated an actino-bacillus in cattle; while Klinger[6] in 1912 observed the *Actino-mycetum comitans*, which constitutes much of the Gram-negative material in the granule. Naeslund[7] in Sweden has made a bacteriological classification of the numerous organisms, and has done illuminating work on the etiology. Last year Cope[8] published the first monograph in English on the subject.

The bacteriology is complicated by the large number of organisms which have been described, only a few of them being pathogenic to man, and none having any marked pathogenicity for laboratory animals. There is no generally accepted classification at present; and for the purposes of this paper I have arranged information from Topley and Wilson[9] based on Naeslund's work. (This arrangement is found in Table I.) The anaerobic *Actinomyces bovis* of Wolff-Israel is the only one recognized by Colebrooke[10] as causing true actinomycosis, and the disease caused by *A. maduræ* he names paractinomycosis. There is some doubt as to the advisability of this distinction, and it might be better to adopt the term actinomycosis to include any disease caused by the genus actinomyces. It will be noticed that *A. graminis* (Harz) and *A. hominis* (Boestrom) have not been included in the Table, the reason being that they have never been generally accepted as pathogenic.

Because of Boestrom's[11] lengthy paper following his isolation of the organism, and the numerous aerobic strains found on grasses, grains, etc., it has been long and almost universally believed that the disease was contracted by chewing straw. All the recent opinion, however, leans towards the view that, as *A. bovis* of Wolff-Israel has never yet been found outside the animal body, and as most of the aerobic strains are saprophytic, the part played by chewing straw is only to make a wound and thus furnish a portal of entry into the body. Nevertheless, definitely aerobic species have been isolated from disease processes in man and animals, and have been brought together by Erikson.[12]

Many cases point to the mouth as the probable source of infection, of which three famous cases may be mentioned: (1) Israel[13] reported one where a fragment of carious tooth was found embedded in a focus of actinomycosis of the

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lung. (2) Judd's[14] case, which followed the extraction of a tooth. (3) Cope[15] reported a case of actinomycosis of the knuckle, which resulted from a blow that broke an antagonist's tooth. To this list I should like to add a case from the London Hospital. In 1934 a man aged 35 had an ulcer on the dorsum of his hand which looked somewhat like a gumma. He admitted the lesion had been caused by the bite of a prostitute. The Wassermann reaction was negative; a biopsy showed actinomyces granules, while in culture the organism grew aerobically. This case is, therefore, classed by Colebrooke as paractinomycosis.

TABLE I.

ACTINOMYCES

	Name	Culture				Pathogenicity		
		Grows at	G.	Clubs	Granules	Man	Cattle	Laboratory animals
FUNGI								
I. Anaerobic.....	*A. bovis* Wolff-Israel	37° C.	+	Clubs	Granules	Cervico-facial, abdominal, thoracic, etc.	Jaw	Local reaction only.
II. Aerobic.....								
1. Non-acid-fast..	*A. maduræ*	20° C.	+	Clubs	Granules	Madura disease.	....	None
2. Acid-fast.....	*A. asteroides*	20° C.	+	None	None	Pulmonary disease.	....	Pseudo-tuberculosis in monkeys, rabbits and guinea-pigs.
BACILLI								
I. Aerobic non-acid-fast.....	1. *Actinobacillus ligniersi*	20° C.	–	Clubs	Granules	....	Woody tongue, soft tissues of head, neck, and lymph glands.	Guinea pigs die in 7 days.
	2. *Actinomycetum comitans*	37° C.	–			Usually accompanies *A. bovis*.		

Naeslund[16] found anaerobic, pathogenic, actinomycotic organisms in the mouths of normal people. Further, he found that when tartar and salivary calculi were decalcified a stroma remained consisting of interwoven actinomycotic filaments. Positive growths were obtained on media of sterilized saliva; some of these were aerobic, but the majority were anaerobic. Organisms definitely recognized as actinomyces were frequently found by other investigators in the mouth and pharynx, and may or may not have pathogenic significance. It follows that a common habitat of these organisms is the mouth.

Probable portals of entry for these pathogenic organisms into the body are, firstly, by way of the alimentary tract. As the ray fungus apparently flourishes in hollows, the sites affected are usually the pockets around the teeth associated with peridental disease requiring extraction, the salivary glands, the tonsillar crypts, and the appendix. The second method is by aspiration into the lungs, where the lesion may be due to either the anaerobic or the aerobic type. The third portal has already been illustrated, namely, direct inoculation through the skin.

The pathogenicity of the various actinomycotic organisms is still a debatable topic for bacteriologists, and, as has been stated above, laboratory animals seldom show anything more than a mild local reaction, or at best abscess formation. A possible explanation of this lack of observed pathogenicity is given by Hassegawa *et al.*[17] In their experimental work, using puppies, they only obtained progressive changes with mixed infections, *e.g.*, of actinomyces with *Staph. aureus, S. viridans,* and *Spirochæta dentium,* the symbiotic effect being much greater than that produced by any of the organisms singly. This hypothesis offers a promising lead for further investigation, as the importance of mixed infection must be assessed in each individual case.

Two main features emerge from a study of any series of cases—the difficulty of diagnosis, and the marked variation in prognosis, depending on the site of the disease. The difficulty of diagnosis is partially explained by the concep-

tion of actinomycosis as a rare disease, so that it is not expected, and by the tedious task of searching through numerous sections, as well as the slow and arduous cultural requirements. A more important reason, however, is the persisting idea that cattle and grasses convey the fungus, and in consequence it is seldom looked for in city-dwellers. To illustrate how the frequency varies with the interest taken in this condition, a comparison of two ten-year periods from the London Hospital and the Royal Victoria Hospital is as follows:

	London Hospital	*Royal Victoria Hospital*
1902 to 1912	14[18]	31[21]
1926 to 1936	103[19]	9

An even more marked decrease in the number of cases has occurred at the Massachusetts General Hospital in Boston, where the work of Homer Wright and Lord had resulted in more cases being recognized there than in any other state in the Union, up to 1925.[20]

The three common sites of infection in the human body show marked differences in results. The cervico-facial type is the most common and gives by far the best prognosis:

	London Hospital	*Royal Victoria Hospital*
Male	34	22
Female	20	9
Total	54	31
Mortality	0	2

One of these fatal cases has already been reported by McKenty, in his paper reviewing all the cases at the Royal Victoria Hospital up to 1913, and the other is reported below.

The abdominal cases show a much greater mortality. In 35 cases at the London Hospital, 16 died, 15 survived, 2 were untraced, and 2 were too recent to be suitable for inclusion; while of 20 cases at the Royal Victoria Hospital, 12 died. A more accurate prognosis, however, may be obtained by dividing the cases into three clinical groups:[22] *Group 1.* Those resembling acute appendicitis; but a residual abscess and/or fistulæ may develop subsequently. *Group 2.* A mass in the lower abdomen, with no obstruction. *Group 3.* Rapid extension by retroperitoneal cellular planes, which can be recognized by the presence of a flexed thigh.

At the Royal Victoria Hospital there were 5 cases in Group 1, all of which have done well; one of them is reported below. In Group 2 there were also 5; 2 died, and 3 were cured—all of these being in the left iliac fossa. Of the 10 cases in Group 3 all died. Thus by careful observation cases in the first group will be noted, and a favourable prognosis may be given; while in the third group the danger signal of a flexed thigh warns of a grave outcome. This leaves only a small proportion of cases where the result is doubtful.

The thoracic cases have by far the poorest prognosis, and in most published figures the mortality approaches 100 per cent. At the Royal Victoria Hospital, of 7 patients, 5 died, one is untraced, and one, whose record is reported below, has returned to work.

The following 3 cases have been selected not only because they illustrate some of the principal features of actinomycosis but also for some interesting individual peculiarities.

CASE 1

W.P., aged 46, a broker.

He was quite well until June, 1938, when he developed a chill and fever after a game of tennis at his country house, where it was his hobby to breed horses and cattle. In July, pain occurred in the right upper jaw, radiating to the mid-line posteriorly. After an x-ray of the right upper molars, one was removed under gas. Three days later the pain increased, accompanied by stiffness of the jaw and a fullness of the right side of the face. Five days after Dr. Young admitted him to the Royal Victoria Hospital on August 10th, spontaneous opening of a peritonsillar abscess occurred, which continued to discharge until the end of September, when the discharge diminished rapidly, to be replaced by pain in the jaw and trismus, usually worse after meals. No bacteriological examination was made at this stage. Meanwhile, about the first of September, the patient complained of diplopia, and he was found to have paralysis of the right external rectus muscle of the eye. At the beginning of October a swelling of the right lower temporal region suddenly developed, immediately above the zygomatic arch, which was only moderately tender to pressure. This swelling slowly increased in size and was aspirated, and the fluid cultured.

Other investigations included an x-ray of the skull on October 20th, which suggested osteomyelitis involving the right side of the basi-sphenoid and extending forward to the pterygoid region. Much of the abnormal bone appeared to lie in very close relationship to the cavernous sinus on the right side.

Two days later a sub-temporal abscess, which extended below the periosteum over the temporal bone, was incised and drained. The pus was obviously arising from beneath the periosteum of the floor of the skull, and Dr. Penfield judged that the origin was mesial to the pterygoid process. Culture of the pus produced a pure, heavy growth of anaerobic actinomyces, which gave the first clue to the cause of an otherwise puzzling condition. On October 29th sulfanilamide, gr. x, every four hours, was started, and continued for four weeks. On November 18th a sub-parotid abscess, which had been developing for three weeks with pain and swelling of the right cheek, was opened and drained. From behind the ascending ramus of the mandible in the region of the parotid gland a thimbleful of brown flaky pus was obtained, and from this were grown very large numbers of anaerobic actinomyces. An x-ray was taken on November 23rd, and suggested that the destructive process involving the basi-sphenoid was extending.

At this time the patient's general condition was quite good. He complained of indigestion and swelling of the right side of the face. The two wounds, only

slightly painful when dressed, were draining well, as was the peritonsillar sinus. He was nervous, moderately deaf in both ears, especially the left, but able to walk for about an hour a day. The sulfanilamide was discontinued and potassium iodide instituted, beginning with gr. x. three times a day. An encephalogram taken on November 25th showed that the process which partially destroyed the basi-sphenoid did not extend backwards to any appreciable extent into the skull in the region of the cisterna pontis or the inter-peduncular cistern. In view of this localization it was considered that drainage of the sphenoidal sinus might prevent further extension into the base of the skull and might avert meningitis, which otherwise was inevitable, and that thymol dressings locally might be efficacious, as his indigestion prevented large doses of iodides and x-ray treatment was of doubtful value, especially at such a depth.

On November 26th Dr. McNally operated, using the right lateral nasal approach to the sphenoidal sinus, which gave a good view of the basi-sphenoid; the bone in this area was softer than normal and appeared to be definitely diseased. However, no free pus was found. Sodium iodide was given intravenously until the patient was able to take potassium iodide by mouth. His general condition improved for a time, but he gradually became irritable again and so, after one week, iodides were discontinued, to be replaced by deep x-ray therapy on December 8th. About this time numbness of the left side of the face developed and slowly progressed; he became quite deaf, with nervousness and exhaustion following the x-ray treatments. He complained of a heavy sensation between the eyes and of feeling cold. The wounds on the face healed, but there was increased discharge from the nose. Puffiness of the right side of the face appeared on December 18th, and, although no definite increase of the destructive process of the base of the skull could be demonstrated by x-ray, it was considered advisable to explore the right spheno-maxillary fossa. Partial removal of the pterygoid bone was carried out, but revealed no pus nor definitely diseased bone. The pathological examination showed inflammatory fibrous tissue, while cultures gave no actinomyces, and a heavy growth of *Staph. pyogenes* and pneumococci, type 21.

Shortly after Christmas he became confused and partially paralyzed, with delirium, due to developing meningitis, which continued into cerebral compression and complete coma. On January 4, 1939, right subtemporal craniotomy and exploration was carried out. There was greatly increased pressure in the ventricles until puncture of the inferior horn was performed, and pus containing actinomyces was recovered from the interpeduncular space. Cultures of the ventricular fluid, the cerebrospinal fluid, and the blood were negative, while that from the interpeduncular cistern was positive, and smears showed definite phagocytosis of actinomyces. The patient died a week later of circulatory failure.

The post-mortem findings were: actinomycotic meningitis; actinomycotic osteomyelitis of the skull involving the basi-sphenoid, basi-occiput, and right petrous ridges; actinomycotic inflammatory changes in the environs of the right pterygoid fossa.

Comment. — This was a cervico-facial case which began with a tooth-extraction, and progressed upwards to the base of the skull by direct spread, until meningitis caused a fatal ending, which is unusual in the cervico-facial type. No connection between his hobby of breeding animals and his infection was proved. There had been marked extension of the disease before the cause was recognized, at which time comprehensive treatment was carried out, the surgery being as extensive as possible. The other forms of treatment included administration of sulfanilamide, which had no effect; potassium iodide was not used sufficiently long for accurate appraisal; blood transfusions from cases of healed actinomycotic patients were also given; the vaccine prepared according to Neuber's[23] method was tried, but none of the reactions for successful treatment could be elicited. This was due, no doubt, to the fact that it was not started until after the development of meningitis. Professor Murray's report states:

"Agglutination: the serum causes very fine flocculation of the antigen in a dilution of 1:5 and not in 1:10 and higher dilutions. It is slow in appearing (48 hours).

"Complement fixation: A completely controlled titration was done, using four quantities of patient's serum from 0.5 c.c. to 0.05 c.c. and two strengths of complement, 3 M.H.D. and 1.5 M.H.D. very carefully titrated. Partial fixation was obtained with 0.5 c.c. of patient's serum and 1.5 M.H.D. of complement. All other combinations gave complete hæmolysis. As a very powerful antisheep hæmolysin was used the actual quantity of complement available for fixation was small and free complement was readily detected. The test, therefore, was stringent.

"These examinations indicate the production of only a just perceptible amount of antibody. It cannot be said whether this is due to the prolonged infection or the vaccine since no titration was done before giving the vaccine."

CASE 2

J.J., aged 27, a bank clerk, was admitted to the Royal Victoria Hospital in March, 1938, under Dr. Armour, complaining of three persistent sinuses in the right iliac fossa, which had developed after an appendectomy sixteen months previously at the Hotel-Dieu. A sinus had appeared shortly after healing of the operative wound, and attempted excision of the fistulous tract had been unsuccessful. He was quite well otherwise. On examination with lipiodol the sinus was found to pass downwards and medially for 6 cm.; it was of small calibre and no loops of gut were outlined. A barium enema showed an irregular outline of the margin of the cæcum, and this part did not fill. There was narrowing of the distal loop of the ileum for 5 cm. from the ileocæcal valve. Fluoroscopic examination showed many contractions of the distal loop of ileum, which descended into the pelvis near the pool of lipiodol from the sinus. The whole colon was spastic, and, after emptying, the distal loops were still very irregular. An x-ray diagnosis of regional ileitis was made; but culture of the scrapings from the sinus showed anaerobic actinomyces. Potassium iodide treatment was started, gradually being increased to 300 grains daily. By September the wound had remained closed for three months, and the patient was back at work. In May of this year (1939) he was still well.

Comment. — Case 2 is included for three reasons. The x-ray diagnosis of regional ileitis suggests a comparison between this syndrome and actinomycosis, the similarity in the description of each being most striking. In fact, it seems that actinomycosis may be a factor in some cases of regional ileitis of the fistulous group. The complete failure to find the causative organism in this disease may be partly explained

by the belief in the rarity of the ray-fungus, which should be sought for more energetically. Secondly, the recognition of actinomyces in appendiceal lesions would markedly increase the number of cases belonging to Group 1, and add to our knowledge of the etiology of abdominal cases. Thirdly, the efficacy of iodide therapy is illustrated.

CASE 3

A.McK., aged 34, a printer, was admitted to the Montreal General Hospital in 1920, complaining of a lump in the right breast. This was diagnosed clinically as carcinoma. The right pectoral muscle with the nipple was excised, and an abscess was found under the muscle, extending into the axilla. It was considered to be an empyema necessitatis, but no communication with the pleura could be demonstrated. The abscess was drained and the cultures were sterile. Pathological section showed inflammatory changes, while no tubercle bacilli could be found. Several weeks later bone appeared in the wound, and at a second operation the third rib was burred in several places. After this the wound gradually healed in a few weeks. The patient remained quite well until March, 1937, when he felt depressed. In August of the same year a tender swelling appeared between the shoulder blades, and when it was lanced pus was obtained. He was then referred to the Royal Victoria Hospital outpatient department with a large fluctuating swelling about 4 inches in diameter. From this a small wound was discharging thin greenish pus. There were no granules in the pus, and x-rays of the chest and vertebræ revealed slight bony involvement of the third rib posteriorly.

The man was admitted to the ward under the care of Dr. C. A. McIntosh, and on October 5th the abscess was thoroughly explored. No deep communication nor anterior extension could be found under the right scapula. No organisms were found on smears nor grown on cultures. At a second operation a month later, a recent anterior right thoracic sinus in the site of the original wound was explored and found to extend up to the second rib and involve the pleura at this point. Portions of the second and third ribs were removed and the wound was packed with gauze. No organisms were found on smears and only a few *Staph. epidermidis* were grown on culture. It was only at the time of the third operation on November 24th, when a small abscess on the back of the neck was opened, that the fungus could be demonstrated. No organisms were found on smears of the pus, while a moderately heavy growth of actinomyces was obtained from the tissue of the abscess wall. Sections also showed actinomyces.

In the middle of December two small abscesses were drained, one on the chest anteriorly and the other on the left side of the neck. As well as the operative drainage of abscesses, he received, from December 1st onwards, potassium iodide by mouth in increasing doses, until during January, 1938, he was taking 400 gr. daily. In April this was reduced to 300 gr. daily. The granulating wounds were slowly healing when he went home, but he returned three weeks later slightly worse. Granules were then noticed for the first time, so the dose was increased again to 400 gr. daily. His improvement was slow, and in August he was re-admitted for sulfanilamide treatment. He was given gr. x every four hours for a week, then had five days' rest, following the procedure recommended by Walker.[24] His weight at this time was 100 lbs., and he had pain in the right shoulder, profuse discharge from the sinuses, and was feeling depressed. The dose of the drug was increased to 20 gr. every four hours, and the blood concentration rose from 3.9 mg. per cent on August 6th to 18.15 mg. per cent on September 17th, when the dose was reduced to 15 gr. every four hours, which maintained the level at 10 to 12 mg. per cent. During this time he gained 15 lbs. in weight, pain was relieved, and only three small sinuses remained.

X-ray treatment was used eight times, but was discontinued as the patient became uncomfortable, slight anæmia developed, and no appreciable benefit accrued. The sinuses healed, and all medication was discontinued. In February of this year the anterior wound re-opened, and a month later, when this was granulating well, the posterior wound began discharging. A new preparation of sulfanilamide (promin) was tried, 9 capsules daily, resulting in slight improvement. In June, vaccine treatment was started, but as yet it is too early to say what effect this will have. It is, however, a suitable chronic case, and it is still our hope to heal these stubborn wounds.

Comment.—Case 3 is reported to show how long it may be before the causative organism can be demonstrated. Only after the third attempt, when the wall of the abscess was both cultured and sectioned, was the fungus seen, and even then the pus was sterile and contained no granules. Later, however, with large doses of iodides, granules did appear. Surgical treatment has been used to aid the drugs and other methods, which seem to be slowly overcoming the infection. The source of this infection is untraceable; there is no proof that the earlier history has any bearing on his present condition, but the reappearance of a sinus in the site of his original pectoral scar, as well as the pleural involvement, is suggestive of a pulmonary origin. His living conditions are poor, and the infection may have been acquired at any time. The teeth have never shown any recognizable actinomyces. Sulfanilamide and promin made a definite improvement in his general condition, while potassium iodide even in massive doses was of only moderate value. This may be due to the type of organism, which has not yet been finally classified.

BACTERIOLOGICAL SUMMARY

Case 1.—Anaerobic actinomyces.

This organism was sent to Dr. E. W. Emmonds, Senior Mycologist of the U.S. Public Health Service, and identified by him as *A. bovis*. A culture was also sent to Dr. H. A. Diddeus, of the Centraalbureau voor Schemmelcultures in Bearn, Holland. His reply, coupled with that of Prof. E. Baldacci, of the University of Pavia, is *Cohnistreptothrix Foersteri*.

Case 2.—Anaerobic actinomyces of the Wolff-Israel type.

Case 3. — Anaerobic microaerophilic actinomyces. Identification not yet complete.

Until a more universally accepted classification by bacteriologists is available clinicians will have to be content with the presence or absence of the

ray-fungus, and call the disease "actinomycosis". The appropriate drug or vaccine, however, will have to be determined in each individual case.

The many forms of treatment testify to the inefficiency of any one type of therapy. Of the drugs, potassium iodide in moderate to large doses, *i.e.*, 150-300 grains daily, is still the main stand-by. Sulfanilamide was used in two cases—the first showed definite improvement in his general condition, but in the other there was no observable effect. This corresponds with other reports, and the conflicting accounts may perhaps be explained by peculiarities of the strain, as well as by the concomitant infection present, *e.g.*, in Case 1, where there was a mixed infection with staphylococci, and the drug had little or no effect, whereas in Case 3, with an unusual strain of anaerobic actinomyces, the improvement was appreciable.

CONCLUSIONS

The pure infections appear to respond better to drugs than do the mixed ones, while it seems possible that the various strains of actinomyces react differently to the same drug. Surgical treatment is imperative in nearly all cases. Where complete excision is possible it should be carried out, but unfortunately this is seldom practicable. In such cases incision and drainage of all abscesses is indicated, combined with such other treatment as may seem best suited to the case. The prognosis varies enormously with the site affected, and a similar variability is observed in the three clinical groups of abdominal infection. Lastly, in all suspicious cases, early and diligent search for the ray-fungus should be undertaken and the abscess wall cultured when the pus is sterile, as it is apparent from the figures presented that interest in this condition and the number of cases found are directly proportional.

My thanks are due to the members of the staff already mentioned for permission to report these cases, to the Department of Bacteriology for their helpful co-operation, and especially to Dr. W. G. Stewart who is working on a classification of these organisms. Finally, I wish to thank Dr. E. W. Archibald and Prof. E. G. D. Murray for their valuable advice.

REFERENCES

1. MOODIE, R. L.: *J. Parasitol.*, 1922-3, **9**: 28.
2. BOLLINGER, O.: *Centr. f. d. med. Wissensch.*, 1877, **15**: 481.
3. WOLFF, M. AND ISRAEL, J.: *Archiv. f. path. Anat.*, 1891, **126**: 11.
4. BELL, J.: *Montreal Med. J.*, 1905, **34**: 81.
5. LIGNIÈRES, J. AND SPITZ, J.: *Bull. de la Soc. cent. de méd. vét.*, 1902, p. 487.
6. KLINGER, R.: *Centralbl. f. Bakteriologie*, orig., 1912, **62**: 191.
7. NAESLUND, C.: *Acta path. microb. Scand.*, Supp. 6, 1931.
8. COPE, Z.: Actinomycosis, Oxford Med. Publications, Oxford University Press, 1938.
9. TOPLEY, W. W. C. AND WILSON, G. S.: Principles of Bacteriology and Immunity, Arnold, Lond., 1936, p. 269.
10. COLEBROOKE, L.: *Proc. Roy. Soc. Med.*, 1930, **23**: 861.
11. BOESTROM: *Beitr. z. path. Anat.*, 1890, **9**: 1.
12. ERIKSON, D.: Med. Research Council, Spec. Report, Series No. 203, 1935.
13. ISRAEL, J.: *Langenbeck's Arch. f. klin. Chir.*, 1887, **34**: 160.
14. JUDD, W. R.: *Brit. M. J.*, 1926, **2**: 886.
15. COPE, Z.: *Brit. J. Surg.*, 1915, **3**: 55.
16. NAESLUND, C.: *Dental Cosmos*, 1926, **68**: 1137. *Idem*: *Acta path. microb. Scand.*, 1926, **3**: 637.
17. HASSEGAWA *et al.*: *Jap. J. Med. Scien.*, v. Path., 1938, **3**: 28.
18. SOUTTAR, H. S.: *Roy. Soc. Med.*, 1912, **6**: 151.
19. DONALD, C.: Personal communication.
20. SANDFORD, A. H. AND VOEKER, M.: *Arch. Surg.*, 1925, **11**: 809.
21. MCKENTY, F. E.: *Am. J. Med. Scien.*, 1913, **145**: 835.
22. WLLIAM, G.: *Proc. Roy. Soc. Med.*, 1912, **6**: 145.
23. NEUBER, E.: *Wien. klin. Wchnschr.*, 1932, **45**: 357; *idem*, 1937, **50**: 1176; *idem*, 1938, **51**: 358.
24. WALKER, O.: *The Lancet*, 1938, **234**: 1219.

EYE SIGNS IN INTRACRANIAL DISEASE*

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THE average day in an oculist's life is spent in considering errors of refraction and in the diagnosis and treatment of diseases of the eye. The routine steps in an eye examination tend to focus his thoughts on the eye alone, and it seems wise periodically to review his relationship to medicine as a whole. The patient when consulting an oculist knows that he is consulting a physician and has the right to expect that the signs and symptoms found will be evaluated in the interests of his general welfare as well as from the standpoint of his eyes alone.

I am, for this period, directing your attention to our relation to neurology. I am doing so since I have to confess that I have made many humiliating blunders in this field because I have been blind to the implications of certain symptoms or findings which should have turned my thoughts in the proper direction.

For example, a patient consulted me for a troublesome irritation and watering of one eye. She was treated for follicular conjunctivitis, but the watering and irritation remained. An

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error of refraction was corrected without relieving her symptoms. Her lachrymal passages were investigated and found to be normal. She had been in my office a number of times before I discovered, what I should have discovered at the first examination, that she had an anæsthetic cornea. Further questions revealed that while she was not aware that she had any hearing defect it could readily be shown that she was markedly deaf in the corresponding ear and a diagnosis of acoustic neuroma was eventually arrived at.

A teacher in mathematics once came to me for refraction because he found himself making stupid blunders in simple addition, and felt that he must need a change of glasses. Repeated changes in his lenses did not in the slightest degree improve his mathematics. The eventual development of papillœdema pointed the way to a diagnosis of brain tumour situated in an area which affected his brain power in the particular way he had first pointed out to me.

We have contact with neurological cases in two ways. We may be asked by the neurological or medical service to report on the eye-findings of a suspected case. Under these circumstances we are looking for certain definite and well known signs. We know what these signs are and we know how to look for them. It is unlikely that we will make frequent or important errors in this department. On the other hand, we see in routine office practice neurological cases who present themselves with no thought in their minds that their trouble is anything but eye trouble. In this group of cases we can make important mistakes which may seriously delay the making of a correct diagnosis. We make these mistakes because our history-taking and our examination tend to become restricted. A reasonable amount of time spent in listening to the patient's complaints and in asking questions which will keep his story to pertinent facts is time well spent in ophthalmic as well as in general practice.

Headache is a prominent complaint common to ocular disorders and to brain tumour. What features should make us suspect that the headache is not of ocular but of intracranial origin? The time factor in the patient's story of his headache is most important. The brain tumour patient will state that for a certain fairly definite period, say three months, he has suffered from a headache which differs from anything he has had before. It is paroxysmal, at least in the early stages. It is often worse when lying down. It occurs chiefly at night or in the early morning. He often wakens with it. With enlargement of the growth the headache tends to become continuous. It is increased by exertion, excitement, coughing, sneezing, vomiting, stooping, straining at stool, by anything in fact which increases intracranial pressure.

The time-factor is equally important in evaluating the mental symptoms. There may be a history of hallucinations of vision, of emotional states, of impairment of memory, of loss of power to concentrate, of seizures epileptiform in character. The verbose and neurotic patient may give a similar history and we are apt to cut him short to get on with the examination. There is however this important difference, that in the latter case the symptoms are presented not as a development of recent months but as a part of his mental make-up.

In the routine examination of the eyes the items which may have a neurological bearing concern (1) the sensory or 5th nerve; (2) the motor nerves to the eye; (3) abnormalities of motion, such as deviations or nystagmus; (4) defects in the visual fields; (5) changes in the optic disc.

Corneal anæsthesia is one of the early signs of acoustic neuroma which can readily be overlooked in a routine eye examination. The patient complains of watering and sensitiveness of one eye. In the presence of such a complaint the corneal sensation should be tested.

The various forms of ocular paralysis are of neurological interest, and will be discussed in connection with their localizing value. Definite paralysis of an ocular muscle with diplopia will be obvious both to patient and to doctor, while muscle weakness more minute in degree will be uncovered by our muscle balance tests. Even here, however, there are one or two pitfalls. The paralysis from a brain tumour is of gradual onset and step by step with its progress the patient may overcome the defect by a slight tilting of the head without being at all aware that he is concealing a diplopia. If the oculist does not notice the head tilting or does not investigate the reason for it he too may overlook the presence of diplopia. Then again one eye may be blind and an obvious strabismus may be ascribed to the quite usual vagaries of a blind eye. Finally the patient may be one

who has been a patient of long standing, on whose muscle balance you have complete notes made at former examinations, and it may seem unnecessary to recheck these findings. Such a situation arose in my own practice. A man who was both an old patient and a friend came to see me one morning stating that he had wakened that morning with a headache and with blurred vision. I already had complete notes on his case and at the trial case his vision with his own correction was normal. I thought his symptoms were those making up a picture of the morning after the night before and did not recheck his muscle balance. That night I was called to see him with his family doctor. A definite diplopia had developed as well as other signs which enabled us to make a diagnosis of encephalitis lethargica. He had a stormy illness of some months' duration but eventually recovered and is again active in his career. I do not suppose that the discovery of an early grade of diplopia when I saw him in the morning would have made any difference to him, but it would certainly have made a good deal of difference to me in the matter of self-respect.

Nystagmus is an eye sign with a possible intracranial meaning. If the components are equally rapid it is probably congenital in origin or due to insular sclerosis. If there is a quick component the sign needs further investigation.

Field defects are extremely valuable signs and those due to brain tumour can easily be missed because the patient is often unaware of their existence and does not make any suggestion which would lead one to suspect their presence. The field defect which is most elusive is that due to a lesion in the temporal lobe. The quadrantic notch here produced may be small, and no feature in the routine eye examination will suggest its presence. Experience shows also that cases of pituitary tumour have frequently been through the hands of an oculist who has failed to note the presence of a field defect. My feeling is that it is in the question of the discovery of field defects that we make our most frequent errors of omission. I think that we should review very critically the technique of our routine examination in the light of this feature. It probably is not feasible to make careful perimeter studies of all our refraction cases, but some quick and reasonably accurate method of estimating the range of the field of vision should be used in every case.

Papillœdema is the outstanding ocular sign of brain tumour. It is not always possible to differentiate between the papillœdema caused by increased intracranial pressure and optic neuritis from other causes. The presence of definite swelling of the optic papilla therefore calls for neurological study. A certain type of optic atrophy associated with characteristic defects in the visual fields is diagnostic of a lesion in the region of the pituitary body.

A general neurological diagnosis having been made, the eye signs are of great value in localizing the disease.

Anæsthesia of the cornea is an early sign of damage to the 5th nerve. Inflammation of the Gasserian ganglion or involvement of the nerve fibres in a growth may produce this symptom.

Paralysis of the 6th nerve alone is of no localizing value. If both 6th nerves are involved the lesion is likely in the medulla. A sudden 3rd nerve paralysis points to a subarachnoid hæmorrhage. All of you I am sure will have seen cases of this type. A man suddenly develops agonizing headache and is found in a state of collapse. After a certain lapse of time he regains consciousness. A severe headache still persists, possibly with some stiffness of the neck, and a more or less complete ophthalmoplegia of one eye is found to be present. Such a case is almost certainly one of subarachnoid hæmorrhage.

A slowly developing 3rd nerve paralysis combined with choked discs suggests a basal tumour usually well forward in front of the carotids. The most frequent growth in this position is a meningioma at the sphenoidal fissure. Nystagmus combined with other signs of brain tumour usually localizes the lesion in the cerebellum; in the right lateral lobe if the nystagmus is more marked to the right; in the left lateral lobe if it is more marked to the left. Vertical nystagmus is associated with irritative lesions of the corpora quadrigemina. In destructive lesions of these bodies the eyes cannot be turned up. Tumours of the pineal body may produce this symptom.

Defects in the visual field produced by intracranial diseases are of great localizing value. A tumour occupying either the occipital or temporal lobe will usually produce a field defect; an homonymous hemianopia if in the

occipital lobe; an homonymous quadrantic notch if in the temporal lobe. Tumours may involve the optic tracts or radiations at any point between the occipital lobe and the optic chiasma and will produce field defects in harmony with their position.

Tumours of the pituitary body affect the optic chiasma. The typical defect produced in the visual field is a bitemporal hemianopia. However, there are great variations in the field defects in accordance with different ways in which the tumour may expand from its bed in the sella turcica. The eye signs of pituitary disease are so important that the oculist should keep himself familiar with the general medical picture of different types of pituitary disease.

Field defects are frequent naturally in cerebral hæmorrhage. In this connection it is interesting to note that the patient whose field defect is from hæmorrhage is usually aware of his defect; the brain tumour patient is often unaware that he has a field defect.

Papillœdema, while of great value in the diagnosis of brain tumour, is of small value in its localization. The fact that it is more constantly present in tumours of certain areas than in others may be of some help. It is almost constantly present in tumours of the cerebellum, of the fourth ventricle, of the temporosphenoidal lobe, and of the region of the corpora quadrigemina; it is absent in half the subcortical cerebral tumours. It appears late in the course of a frontal lobe tumour. It is often severe in intracranial tumours which are extracerebral. The fact that the papillœdema develops in one eye before it does in the other, or that it is more marked in one eye than in the other, is not conclusive evidence that the brain lesion is on the corresponding side. I believe however that a brain tumour is more often on the side of the greatest papillœdema. The optic atrophy produced by a pituitary tumour has features which differentiate it from ordinary optic atrophy. When combined with the characteristic field defect these changes are sufficient to make a diagnosis of a tumour in the pituitary region. A primary optic atrophy of one nerve head and a papillœdema of the other may indicate a meningioma of the olfactory groove. Exophthalmos on one side combined with papillœdema may also be produced by this tumour.

Finally, ophthalmic findings are of considerable value in estimating the progress of intracranial disease and in evaluating the benefit derived from medical or surgical treatment. Variations in the amount of diplopia, changes in the magnitude of field defects, and alterations in the fundus picture form delicate and important indications of the course of the disease. In the case of tumours which cannot be removed the only reason for interference may be to preserve sight. How are we to tell when the sight is endangered? Papillœdema may be present for a long time without apparent damage to sight. The number and extent of the hæmorrhages, the amount of white exudate, the degree of transparency of the swollen nerve, the presence or absence of pallor, the size of the arteries and veins, lines along vessel walls and signs of scar-tissue formation are points to be considered. Periodic field studies are also of great value in helping to decide whether or not sight is endangered. When there is definite evidence of secondary atrophy a decompression operation may only hasten the advent of complete blindness.

STORAGE OF BLOOD FOR TRANSFUSIONS.—A limit of between five and ten days for the use of blood for transfusion after it has been stored appears to be a safe restriction, due to the less satisfactory or even dangerous results which may follow the use of older blood. The obvious advantages of storing blood for transfusion have led to the adoption of "blood banks" by many larger hospitals throughout the country. With regard to results of transfusion it has been found that there is no difference in the incidence of untoward reactions provided the blood has not been kept too long. Investigations indicate that blood more than from a week to ten days old is not equivalent to fresh blood. Indeed, with blood that is too old there is even some danger of blood in the urine and serious symptoms such as are known to result from the transfusion of incompatible blood. When the available data are taken into consideration it is evident that the transfusion of preserved blood has acquired an important rôle. This is a great change in attitude from the opinion held less than two decades ago, when the transfusion of citrated blood, even when fresh, was looked at askance. However, there are definite limitations to the use of stored blood which should be taken into account. Perhaps by improving the method of storing blood it may be possible to extend the time limit.—*J. Am. M. Ass.*, 1939, **113**: 2061.

THE MANAGEMENT OF LABOUR IN ELDERLY PRIMIPARÆ*

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IN this survey we were interested only in such details as: number of years after marriage; when pregnancy occurred; the course of the condition; the character and length of the labour; the spontaneity or artificiality of its termination; and, finally, the results to mother and child.

When one broaches the subject of the elderly primiparous woman, so often some one intrudes with the startling story of the wonderfully rapid and easy delivery of a nine-pound baby to a private patient who was over forty years of age. We all have had such cases, but how do these compare with the majority? A dead-born baby is a great calamity, but a live baby mentally injured is a disaster. Students of criminology tell us that many of the law-breakers of today reveal, upon investigation, that some sort of instrumentation was employed at birth. Further, it has been our experience that the majority of women, thirty-five years and over, meeting with the loss of their first born, seldom make the effort a second time.

We have chosen the male athletic peak of thirty because it is well known that in man both powers of effort and endurance begin to decline after that period in life has been reached. Labour is dependent upon these two great factors in women.

The study has been divided into three periods: thirty to thirty-five years, thirty-five to forty years, forty and over. Similarly, these have been further separated in regard to their menstrual histories and the relation of pregnancy to the number of years since marriage. The clinical histories at our disposal consisted of the records of the Royal Victoria Montreal Maternity Hospital from the year 1931 to 1938 inclusive. From these were obtained the records of the pregnancy and labour of 1,179 women thirty years of age and over. Our studied series are those which have, to the extent of 90 per cent of the grand total, been under our supervision during at least the latter 12 weeks of their pregnancies.

TABLE I.

Age	*Number of cases*	*Pre-eclampsia*	*Eclampsia*	*Placenta prævia*	*Accidental hæmorrhage*
30 to 35 yrs.	933	143 (15.3%)	9 (0.9%)	5	7
36 to 40 yrs.	196	45 (22.9%)	4 (2%)	3	2
40+.....	50	5 (10%)	1 (2%)	1	1
Grand Total.	1,179	193 (16.3%)	14 (1.4%)	9 (0.7%)	10 (0.8%)
Non-viable..	27				
Viable clinic.	1,152				

Table I shows, as one would expect, a very great preponderance in cases in the first period. In the more formidable complications, namely, pre-eclampsia and eclampsia, these reveal very startling figures when compared with those of their younger sisters. Placenta prævia and accidental hæmorrhage did not, however, intrude more frequently.

In a former investigation of 12,000 pregnancies concerning all ages we were able to demonstrate a frequency of pre-eclampsia of 4.4 per cent, of eclampsia 0.9 per cent. It will be noted that in these older women the incidence of pre-eclampsia is almost four times as great, of eclampsia, almost double. Pregnant women of the second period seem more prone to fall victims to these complications.

The smaller percentage in the third group is, no doubt, influenced by the number of cases, but we believe the age of the patient, her fear and that of her doctor, determined a closer and better co-operation.

Of the 1,179 pregnancies and labours we have purposely considered those from whom it was possible to obtain living children. Consequently we have eliminated monstrosities, macerated fetuses, and all those born under twenty-eight weeks. This number amounted to 27.

Examination by palpation revealed the vast majority to be cephalic presentations in good

* Read at the Seventieth Annual Meeting of the Canadian Medical Association, Section of Obstetrics and Gynæcology, June 21, 1939.

TABLE II.

Presentation	*Position*	*Attitude*	*Pelvic deformity*
Occiput... 1,103	Anterior 900 Posterior 203	Flexion 884	198 (male predominant)
Brow or face 16			
Breech..... 60			
Engagement 982			
Floating head..... 197			

flexion; a very small quota, in different degrees of extension. The breech cases occurred in about the usual frequency. A surprisingly large proportion were found to be engaged and also in the anterior position. The right occipito-posterior variety can be seen to be quite in excess of the left posterior type.

Pelvimetry and vaginal examination demonstrated varying types of pelvic deformity; the male type predominated. The number of these, considering the whole series, was not large. In every case where Müller's test revealed a potential grave disproportion an elective Cæsarean section was performed. This was especially true in the two groups from thirty-five years onward. In the thirty-five to forty year group 15.8 per cent of women were sectioned. In the forty and over 36 per cent received the same surgical procedure. In the first group this figure was markedly reduced to 5.9 per cent.

As recorded at the beginning of this report, the literature, which is scanty, rather expresses the opinion that these aged primiparæ do almost as well in the effort and result in pregnancy and labour as their younger sisters. In relating the experiences of this clinic we prefer to leave the judgment upon this subject in your hands.

TABLE III.

LABOUR

Spontaneous onset	706
Induced	335
Cæsarean section	111

COURSE OF LABOUR

Spontaneous delivery	385
Operation procedure	767

COMPLICATIONS OF LABOUR

Primary inertia	81
Mechanical arrest at outlet	228
Failure to engage	50
Secondary inertia	327
Failure of rotation	56
Fetal distress	202

Spontaneous onset of labour was the predominating type. Of the inductions recorded 223 were attempted for potential disproportion, the remainder largely for increasing toxic signs and symptoms against treatment; a negligible few, for cardiac and arrested pulmonary disease. We have failed to appreciate the efficiency or safety of the hydrostatic bag or bougie and have had much better results using a repetition of the medical method. One hundred and six Cæsarean sections were demanded by grave disproportion. The course of labour is here shown to be far from a smooth one. Spontaneous delivery occurred in but 33.35 per cent of cases.

The extreme frequency of inertia, both primary and secondary, was an outstanding complication. Mechanical arrest at the outlet was due to the male type of pelvis, but just as largely so to the mother's fatigue. This particular complication was not difficult to overcome. Failure of rotation and lack of ability to engage were relatively infrequent causes of fetal wastage. In 34 out of the 50 of these latter ones low cervical section performed in early labour solved the problem.

Fetal distress developed in the vast majority of cases as the result of a tedious inert labour.

TABLE IV.

LENGTH OF LABOUR

Longest	74 hours
Shortest	4½ "
Average	27.5 "

WEIGHT OF CHILDREN

Heaviest	4,500 grams
Smallest	1,800 "
Average	3,105 "

Table IV demonstrates that one may upon rare occasions have to deal with an abnormally short labour. The average case takes a long time. A younger woman has the endurance to stand such punishment for many hours; the older group in our experience often crumble and leave the obstetrician to deal with an undilated cervix and a fetus in distress.

The size of the child played a most important part in the character of the outcome. When these women, irrespective of the pelvis, attempted to give birth to children over 3,000 grams in weight complications of labour were almost invariable.

TABLE V.

OPERATION PROCEDURES

Low forceps	281
Mid-forceps	300
High forceps	14
Breech	38
Piper forceps	22
Cæsarean section	111
Destructive operation	1
Episiotomy	1,007

When an obstetrician is faced with a list of necessary operative procedures such as this table shows one wonders at the casual attitude to date. Elective low-forceps was performed in 53 cases. The remaining 231 were demanded by an associated secondary inertia and fetal distress. In this clinic we approach the application of mid-forceps, no matter what manœuvre is used, with definite trepidation and the delivery of a breech with the highest respect.

In the series tabulated only a small minority demanded special manipulation, such as the Melhado, Scanzoni, Pomeroy, Keilland or Barton manœuvres: 244 were straight cephalic applications to the anterior position. Forceps upon the after-coming head without doubt reduced the fetal mortality in breech cases.

The high-forceps group, we readily admit, were the result of poor judgment. Not always ours, because cases are frequently landed upon our doorstep, when the choice lay between this procedure and craniotomy. Cæsarean section has already been discussed. Episiotomy is a routine procedure in practically every primiparous woman.

TABLE VI.

MATERNAL RESULTS

Maternal mortality	*Morbidity*	*Complete tears*
30 to 35 years—6 (0.5%) 35 to 40 years—2 (1%) 40+ years—1 (2%)	213 (18.8%)	19

Cæsarean section deaths	3 (2.7%)
Other deaths	6 (0.5%)

RESULTS

The maternal mortality of the whole series stood at 0.7 per cent. This does not compare unfavourably with the maternal death rate of the clinic as a whole. Three of our nine deaths occurred in moribund women who were sectioned for the sake of the child alone. A fourth was admitted after forceps and version had been tried in the home. Porro Cæsarean section was performed, but the patient died of sepsis upon the eighth post-partum day. Of the remaining five one died of surgical shock upon the operating table, the other four of post-partum sepsis.

The table does indicate the increasing danger to the ageing mother. Each quinquennium according to the figures presented would seem to double this menace.

The maternal morbidity, based upon one reading of 100.8 or over after the first post-partum twenty-four hours reached 18.8 per cent.

TABLE VII.

FETAL RESULTS

Fetal mortality—spontaneous labour under 30 years 1.7%
" " " " over 30 " 3.4%

Age	*Cæsarean section*	*Other methods*
30 to 35 years	1 (1.8%)	63 (7.1%)
35 to 40 years	4 (10.1%)	7 (4.4%)
40+	0 0	9 (28.0%)
Total	5 (4.1%)	79 (7.5%)

Even when spontaneous labour occurs one sees that the fetal mortality was in the older woman, compared with that of her younger sister, almost three times as great. In the thirty to thirty-five years group we have the extremely high fetal loss of over 7 per cent. The series is a very much larger one than the other two. Naturally, many more attempts were made to obtain spontaneous labour.

The high fetal wastage after Cæsarean section in women of the thirty-five to forty year group was due to three cases of severe fulminating eclampsia in the mother, the three children living but a few hours after birth. One child, however, did die of trauma.

We want to draw particular attention to group 3; forty years and over. In this group we present 50 cases. Eighteen of these received elective Cæsarean section. Mother and child in all presented a most successful issue. Of the remaining 32 where labour was attempted the horrifying loss attained 28 per cent failure.

The total loss of our whole clinic, which includes these figures as well as all toxæmias and monstrosities, remains at the level of 4 per cent. Compared with this our selected series almost doubles this at 7.5 per cent.

Sterility following marriage for a period of over two years had a very direct bearing upon the complication of primiparous inertia particularly, and in many of the cases of the secondary type. A history of delayed development of the menses, especially when associated with irregularity was elicited in many of these two kinds of inertia. These two types of women almost universally exhibited a weak type of contraction accompanied by considerable pain. The results so frequently ended with a half dilated cervix, an exhausted mother and child. Their contribution to the mid-forceps statistics was a large one.

CONCLUSIONS

1. Pelvic asymmetry, presentation and position have no doubt been decisive factors in the minority of our results. They do not, however, play a major rôle.

2. From the standpoint of functional capacity to avoid toxic invasion these patients are far below the standard of those under thirty years of age.

3. Women sterile for over two years after marriage, or who have exhibited a marked delay in the development and irregularity of the menses, must be placed under strong suspicion with regard to inertia in labour. If the first stage of labour in this class indicates a primary inertia low-cervical Cæsarean section should be indicated.

4. Indications of a mild degree of disproportion may be given to a definite degree the trial of a second stage, in women between thirty and thirty-five, but never from thirty-five years onward.

5. A rigid long cervix is pathognomonic of dire trouble, and in these women, especially after thirty-five years of age, is an indication for section.

6. If success is to be hoped for in labour the child should not weigh more than 3,000 grams.

7. Breech presentations, despite the pelvis, in women over thirty-five years are better delivered by Cæsarean section.

8. In the forty years and over group, unless the lower uterine segment is thoroughly thinned out and the head down to the level of the ischial spines, from the statistics presented, any attempt at delivery through the pelvic canal would seem unjustifiable.

9. The management of labour in elderly primiparæ begins at the earliest possible date in the prenatal period. Every effort should be made to bring the patient into the most perfect physical condition possible. It is also advisable to have a definite plan of action, thoroughly understood by those most concerned.

10. In the two decades from thirty to forty years of age, when no disproportion exists, we must decide upon one of two procedures: (*a*) induction of labour when the child is of smaller size; (*b*) await the spontaneous onset of labour, watching the progress of cervical dilatation and fetal descent; if these are not normally progressive perform low-cervical section.

11. Women over thirty are not good obstetrical risks; over thirty-five, poor ones; over forty, bad ones.

THE DIAGNOSIS AND TREATMENT OF ENDOMETRIOSIS*

BY GEORGE HOOPER

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ENDOMETRIOSIS today is playing such a large part in gynæcology that it is fitting that your Committee should ask me to limit my paper to the diagnosis and treatment. Even as it is, I am afraid that I shall wander into the theories and causes; because, to properly treat the condition it is necessary at least to be cognizant of the present day knowledge of the theories of causation.

Until Sampson[1] in 1921 first published his original report based on 23 cases, very little had been written about this condition. Von Rokitansky[2] in 1860 described adenomyoma as a pathological entity. In 1896 von Recklinghausen[3] published articles with reference to tumours arising from the Wolffian ducts. Russell in 1899 first described endometrial tissue in the ovary. It is surprising that Cullen, who did so much work on adenomyoma of the uterus, did not carry the subject to its logical conclusion and connect each phase into

* A paper read at the Seventieth Annual Meeting of the Canadian Medical Association, Montreal, Section of Obstetrics and Gynæcology, June 22, 1939.

one entity as Sampson did. Sampson's theory is the most widely accepted, and although it is not entirely satisfactory it applies to most conditions. Meigs[4] has brought forward a very interesting theory which is based on the modern tendency to contraception and its deleterious effects.

Very recently the question has arisen as to what part the indiscriminate use of œstrogenetic hormones plays in the causation of endometriosis. Personally, I have not seen a case where this is applicable, but it is a distinct possibility.

Considering how common this condition is today (some gynæcologists report evidence of endometriosis being found in about 33 per cent of all cases operated on) how is it that the earlier clinicians failed to note it? Their knowledge of pathological entities might not have been so great as ours at present, but they were keen observers and made minute notes of all conditions. Was it because it was not common then? Is it a new disease?; if so, why? Has our study of endocrinology focused our eyes on this condition? Certainly in the last few years there has grown up an enormous bibliography.

A few years ago, in cases of suspected and proved endometriosis, I began doing endometrial biopsies at certain stages of the menstrual cycle. Along with this I attempted estimation of prolan A and œstrin. Unfortunately I was not in a position to carry this on, nor were my controls numerous enough to make my work of any value, but I did find a tendency to a higher œstrin content.

The age-incidence is primarily that of menstruation and it is during this period that the most symptoms arise. The younger the patient, the more severe and extensive the condition. I have never seen it before puberty and my oldest patient was seventy, on whom I did a vaginal hysterectomy for complete procidentia. Pathological examination showed a well marked adenomyoma of the uterus. This patient had never had any symptoms during her whole menstrual age, had had numerous children, which as a rule, is not common, and the only reason for operative intervention was the procidentia.

Interesting conjectures are: when does this condition start? what limits its growth? why are some cases invasive and progressive, others not?

The most common symptoms are: acquired dysmenorrhœa which occurs throughout the period; backache; pain at ovulation; irregular menstruation, generally with clots; swelling of the groin; leukorrhœa; rectal and bladder bleeding; intestinal obstruction; nervous instability.

As in most surgical conditions, the clinical picture is seldom present in its entirety. Occasionally one may find all these symptoms; more often only one or two are present, and many times none. Again, like many gynæcological conditions, it is hard to evaluate the symptoms on account of the unstable nervous make-up of the patient, which is particularly worse at the menstrual cycle.

So far as is known, endometriosis is never seen above the umbilicus, but may occur and involve any organ below and including it. The one exception to this that I have seen is endometrial implants in a scar following a Cæsarean section.

If one accepts Sampson's theory of a retrograde flow or invasion of endometrial tissue through the tubes and implants on surrounding organs the pathological process is easy to understand. The wandering endometrial tissue follows the known laws in the new place as it did in its natural site and the usual phases of the cycle take place. It is during the proliferative phase or at or after ovulation that the most symptoms are noted.

I am not going to attempt a pathological description of the condition because it is familiar to all, except to stress the fact that, due to œstrin stimulation, there is a gradual and progressive invasion of the pelvic organs, and it is this œstrin stimulation in the aberrant endometrium which causes the symptoms. It is best seen in the "chocolate cyst" of endometrial origin and in endometrial invasion of the gut. This involvement of the bowel gives rise to obstructive symptoms, sometimes complete, requiring emergency surgery. It simulates carcinoma and many times may be difficult at the first glance to differentiate. However, careful examination will usually reveal one or more blue-domed cysts, which is, of course, diagnostic.

As in all pelvic conditions, there are generally other pathological changes, the most common being fibromyomata. Chronic salpingitis, of course, may always be present, and simple ovarian cystomata occur. Adhesions of the bowel to the pelvic organs, etc., are always

present, but this is part and parcel of the condition, not an associated one.

Much has been written *re* the œstrin causation of fibromyomata (notably, Wotherspoon) and as fibromyoma is such a common condition associated with endometriosis, one wonders if there may not be a similar background. This question again brings us back to the etiology and, as I stated before, Meigs brings forth the idea that endometriosis may be due to late marriage, contraception, few children, thus allowing uninterrupted and protracted œstrin stimulation.

Irregular and profuse menstruation is progressive, the first few months hardly noticeable, but gradually increasing in severity, with clots. These cases as a rule do not respond to endocrine medication, and on endometrial biopsy the findings are characteristic, being hyperplastic, suggesting a Swiss cheese type.

Rectal bleeding I have seen twice, and this may give rise to some worry that a malignant growth is the cause. But the history of bleeding occurring after ovulation near the period, the absence of any palpable or visible growth in the rectum, accompanied with the pelvic findings, will generally confirm the diagnosis.

Hæmaturia I have never seen, but from all accounts, on cystoscopic examination, blue-domed cysts are visible. Here again the history of periodicity will give one the lead.

Involvement of the round ligaments, with swelling in the groin, is very easily diagnosed on account of the fact that they are always tender and much larger at the menstrual cycle.

The vague abdominal pain associated with gastro-intestinal symptoms has been the cause for many an innocent appendix to be removed. It is hardly necessary to state again that thorough exploration should be carried out in operations for the so-called "chronic appendix".

Cattell stated that the pre-operative diagnosis of endometriosis is seldom made. I think, however, that with a careful history and awareness of this condition it can be diagnosed, or, if not definitely labelled at least put down as a probability.

The diagnosis of endometriosis is in most cases made by the history, or at least the history points the way, because in many of the early cases the findings on examination are not definite. In the farther-advanced ones, a uterus that is pulled back, partially fixed, a thickened recto-vaginal septum that has a pebbly feel, with thickened or even cystic adnexa, the diagnosis is absolute. In my opinion a thickened recto-vaginal septum with partial obliteration of the pouch of Douglas is diagnostic, even though the history does not apparently fit in. Incidentally, a recto-vaginal examination gives more information than a straight vaginal one. In other cases enlarged, cystic ovaries (bilateral), that are partially fixed and tender, associated with uniform enlargement of the fundus, are suggestive. A single, fixed, firm ovarian tumour about the size of an orange, is rarely endometrial in origin, more likely to be dermoid, although it may be a single chocolate cyst, though these are usually bilateral. Of course where one finds the pelvis filled with fixed multiple fibromyomata and associated adnexal disease it is generally just guess work to say that the cause is endometrial, although you may think so.

A few cases are seen with the diagnosis of acute intestinal obstruction with all the attending symptomatology. Pelvic examination in these cases, if at all possible, generally reveals an enlarged, fixed uterus, bilateral adnexal disease, and all the findings as stated above. The obstruction of course is of primary importance, but endometriosis must be considered as a cause, particularly if the history fits in.

Chronic pelvic inflammatory disease associated with fibromyomata will give about the same findings on examination, except that there is a slight distinct difference, the recto-vaginal septum does not have the pebbly feel; then of course the history is different, the blood count generally much higher, etc. Of course an acute salpingitis may be superimposed on endometriosis.

The white blood count in endometriosis is slightly increased and the patients are generally anæmic. Strange to say, I have often noticed endometriosis in the tall, thin, asthenic type of woman although I doubt if this has any real bearing.

Routine basal metabolic rates have revealed nothing. Sterility is the rule but not at all constant. One must remember that there are so many phases to the condition, sometimes the most involved causing the least symptoms.

TREATMENT

This part, in my mind, is the most difficult. You can always cure the disease but often at what a price.

Bilateral oöphorectomy, which automatically stops œstrin stimulation, will prevent further invasion and growth, and almost at once there is regression of the masses. It is surprising to see how an apparent carcinoma of the bowel will melt away after bilateral oöphorectomy. The mechanical adhesions of the condition will not disappear, and it is necessary to clean out the pelvis, but not at all essential to try to remove the secondary deposits of endometrial tissue. However, as I said, this is curing the disease at a severe price.

In patients who have had severe symptoms for many years and in whom you find a very diffuse and widespread endometriosis, then I think, no matter how you dislike doing it, that a radical operation is necessary. In those who are at or near the menopause and have had children, or in unmarried women near the menopause with a diffuse endometriosis, then again I advise radical operation. But in the vast majority of other cases I strongly advise some form of conservative treatment, especially if the subjects are young and have not many or severe symptoms, nor have had these symptoms long.

If you have made a diagnosis without operation, then explain fully to the patient the problem and ask for her co-operation, not always easy, but it is generally given. Do not rush into surgery.

I must say that the medical treatment is unsatisfactory. Advise marriage if at all contemplated. Anterior pituitary-like substance occasionally controls the menorrhagia. General hygienic and symptomatic measures such as rest, diathermy, mild sedatives, and perhaps a D. and C., which may be repeated. Try to carry on for at least a year before operating. Of course many of your patients will leave you and go elsewhere.

When you finally do operate, try to be conservative. If possible, leave an ovary or even part of one. Those patients who are not too severely or extensively affected often are greatly improved, and, although not cured, may be comparatively symptom-free and may even have children following a conservative operation. I could quote numerous case-histories showing this; one woman in particular who had severe rectal bleeding and dysmenorrhœa, has been for the last eight years much better, with no rectal bleeding, very little pain, periods fairly normal, and yet at the time I did the conservative operation I was very dubious as to my result.

Again I would stress the importance of explaining fully to your patient after a conservative operation what you have done and why you did it, because later you may and often do have to re-operate for the same condition, now of course more extensive. Only lately have I operated on three cases on whom I had formerly done a conservative operation. But at least you have given them the chance.

In intestinal involvement, either resection, short-circuiting, or a temporary colostomy is often necessary. Two or three times where the cæcum has been bound up with large chocolate cysts I have found it much easier to resect. With radium or x-radiation I have not had much success. In the mild cases you may destroy too much ovarian tissue, and in the severe cases one is, I think, inclined to do too much damage, getting sloughing occasionally, and of course the mechanical adhesions are not cured, generally made much worse.

Following a radical operation do not give any of the œstrogenetic hormones because you will have recurrence of your symptoms. I did this in a few cases without thinking and got a return of the old symptoms.

In conclusion I would like to stress (1) further investigation into the etiology, and thus the treatment; (2) the importance of the disease; (3) the large number of cases seen; (4) the progressive and invasive character of the condition and any relation to carcinoma; (5) the many phases and symptoms; (6) the importance of conservative treatment.

REFERENCES

1. SAMPSON, J. A.: Perforating hæmorrhagic (chocolate) cysts of the ovary, *Trans. Am. Gyn. Soc.*, 1921, p. 162; and *Arch. Surg.*, 1921, 3: 245.
2. v. ROKITANSKY, C.: Ueber Uterusdrusen-Neubildung in Uterus- und Ovarial-Sarcomen, *Ztschr. d. k-k. Gesellsch. d. Aerzte zu Wien.*, 1860, 37: 577.
3. v. RECKLINGHAUSEN: Ueber die Adenomyome des Uterus und der Tuba, *Wien. klin. Wchnschr.*, 1895, 8: 530.
4. MEIGS, J. V.: Endometriosis—a possible etiological factor, *Surg., Gyn. & Obst.*, 1938, 67: 253 (edit.).

HYDATID DISEASE

BY J. CARL SUTTON

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AS in the case of many other maladies the greatest impediment to the recognition of ecchinococcic infection is failure to think of the condition actually at hand, even though the characteristic signs and symptoms may be present.

Hydatid disease is a relatively rare disease in America, and particularly in our section of Canada; it is commoner in western Canada (Winnipeg), due to the great number of Icelandic immigrants. Nevertheless, in going over the records of the Montreal General Hospital, one notes that it occurs frequently enough here to warrant its being brought to everyone's attention.

In 1906, Dr. C. K. P. Henry,[1] of the Montreal General Hospital, reviewed the records of that Hospital, and published in the *Montreal Medical Journal* an article on eleven cases. Since then ten other cases have been admitted to the same institution.

That we may form an idea of how much of a national malady ecchinococcic disease may be in a hydatid-stricken country, I am going to quote Sir Louis Barnett.[2]

> Hydatid disease admissions in the year 1937 were 126, the second highest on record. Deaths in hospital were 8, and in all New Zealand, 14. From 1933 to 1937 there were admitted to the New Zealand public hospitals 587 cases. Mortality figures from the disease are about 10 to 12 per cent. The incidence in sheep and cattle found harbouring hydatid disease at abattoirs is appalling and shows no signs of diminution. Half of the farm animals are reputed to be infected. From the above statements one can surmise how easily dogs become infected. Actually there is a considerable degree of immunity in dogs,—researches at the medical school go to show that only about one-third of New Zealand dogs are susceptible to infection. In New Zealand there are about 150,000 dogs and 1,500,000 people and some 50,000 dogs are broadcasting hydatid disease.

Distribution.—Carriage by the blood stream seems the most logical distribution. The liver is the first filter. If the organism gets through the hepatic capillaries and enters the pulmonary circulation the lungs will be involved; they are the second commonest site. The distribution of the primary hydatid cysts is as follows: liver, 76.6 per cent; lungs, 9.4 per cent; muscular and subcutaneous tissue, 5.2 per cent; kidney, 2.3 per cent; spleen 2.1 per cent; bones, 0.09 per cent; orbit, 0.07 per cent; brain, 0.06 per cent; other sites, 2.2 per cent. Multiple infestations are present in 60 per cent of the human cases. Simple cysts are common in children and young adults; their outstanding characteristic is their latency.

Complications. — Rupture, commoner as age advances, varies from a slight leak to frank rupture. This may happen during sleep, or after a blow. Such rupture takes place commonly into subcutaneous or muscular tissues, bile ducts, bronchi, alimentary or urinary tract.

Sequelæ of rupture.—There may be (*a*) immediate; (*b*) delayed (secondary cysts); hydatid anaphylaxis (Deve, 1911). Special features applicable to cases of rupture into natural channels, are (*a*) immediate mechanical effects; (*b*) death from suppuration of the cyst; hydatid anaphylaxis.

Many clinicians have noted peculiar toxic manifestations after puncture or rupture of hydatid cysts. Here I would like to mention the experience of a French physician, P. Guibal[3] (Beziers). He states that it is believed that the puncture of non-infected hydatid cyst ordinarily is free from danger. This, he says, is wrong because of the great toxicity of the hydatid fluid. He further states that there is no relation between the reaction and the quantity of fluid withdrawn; a small leak of hydatid fluid in the peritoneal cavity may, and does, cause death from anaphylactic shock. Such patients have been sensitized by small absorptions, which play a rôle of preparatory injections, and he goes on to give the history of two patients in his experience who died from anaphylactic shock, after puncture of a hydatid cyst.

Although these reactions are usually cutaneous, such as urticaria, erythema and pruritus, many other manifestations may occur, and there is no doubt that these are usually anaphylactic, due to sudden absorption of a specific protein in a sensitized patient. That most patients harbouring a hydatid cyst are specially sensitized is borne out by the high percentage

who give a positive Casoni intradermal reaction.

The Casoni intradermal test is considered to be the most valuable test. The material used in the skin test is hydatid fluid obtained aseptically from cysts of the lung and liver of sheep. Three-tenths c.c. of sterile fluid are injected intradermally, and a control test of an equal amount of saline solution is injected in the same way. An urticarial wheal surrounded by a zone of erythema appears in ten to twenty minutes, followed some hours afterwards by a larger area of erythema. The delayed reaction may last from twenty-four to seventy-two hours, and usually is accompanied by redness of the area and œdema of the subcutaneous tissues.

Rupture of a hydatid cyst or puncture with evacuation rarely causes death of the parasite. Unless followed by infection the parasitic elements, particularly the scolices, may develop into new cysts at a distance, (multiple cysts are rarely due to multiple infection). The scolices can and do revert in their life cycle. This view was considered a biological heresy until 1900, because it was contrary to all the laws of development of the cestodes as laid down by Van Beneden. Recognition of this has led to great advances in the understanding and treatment.

Secondary cysts of the peritoneum and pelvis.—These are common and are due to leakage of scolices from the primary cyst. Gravity movements of intestines will send them to the lower part of the peritoneal cavity. Case 5 in our series is an example of this. Gynæcologists and obstetricians should be warned that one must consider pelvic hydatid cysts as a possible cause of pelvic tumours which occasionally obstruct labour. Two such cases were reported by Embrey.[4] Both cases were examples of secondary ecchinococcosis with multiple cysts in the peritoneal cavity. In neither case was there history of anaphylactic manifestations such as frequently accompany rupture of the primary cyst. Although hydatid disease had probably been present for several years it had not been suspected. In the first case it was discovered at the fifth month of pregnancy, and in the second, during labour.

The secondary cysts soon are surrounded by lymph and eosinophiles, with the usual reaction which may be so extensive as to imitate tuberculous peritonitis; also the peritoneal reaction may be such that one might suspect them to be retroperitoneal; hence the reason why the older teachers held they were primary. Many scolices are overwhelmed and degenerate, but those that survive form secondary cysts. The rate of growth of secondary cysts is very slow, with a latent period of from five to twelve years; usually at the time of rupture they are misinterpreted. Secondary abdominal cysts are usually multiple and as a rule irregular in size and shape; they are prone to rupture with a repetition of the above mentioned effects. If the peritoneal cavity becomes filled the condition is then termed hydatidosis. Sometimes coexistent communication with a bile duct causes leakage of bile into the peritoneal cavity—often a difficult condition to diagnose.

Metastatic secondary ecchinococcosis.—This condition is caused by the rupture of a fertile simple cyst into the heart or venous system. If on the venous side the scolices are carried to lungs; if on the left side of heart, usually to the brain, due to the relatively large size of the carotid arteries, and their place of origin from the aortic arch. In this case the brain becomes the seat of 60 to 70 per cent of these secondary cysts; some scolices, however, may escape to the kidney, spleen or liver.

DIAGNOSIS

Microscopical examination should always be made. These products are very resistant, and the membrane, scolices, or hooklets can often be found after the death of the parasite. X-rays are helpful, but the correct interpretation of the many manifestations of the cysts is difficult, especially in young subjects and in cysts which have ruptured. Professor Friedrich (Ulm) feels that if a flat roentgenogram is taken of the abdomen, and if there are small calcifications throughout the parenchyma of the liver, such roentgenographic appearance is pathognomonic of ecchinococcic disease of the liver.

Special tests.—The precipitin test of Fleig and Lisbourne is of limited value. The complement fixation test as modified by N. H. Fairley (1922), using fresh hydatid fluid from sterile sheep cysts as antigen, has replaced the precipitin tests. In uncomplicated cysts, particularly, the Casoni intradermal test, using sterile hydatid fluid from sheep is very valuable. By a combination of the above 90 per cent of all cysts can be diagnosed.

There are two forms of hydatid cysts of the liver, complicated and uncomplicated. In the simple hepatic cyst, the outstanding clinical aspect being its latency, symptoms may be lacking. Tumour formation is often noted in the upper abdomen. If in the upper part of the liver the condition may not be recognized until the patient is relatively old. Pressure effects are rare, and a large tumour is characteristically rounded, smooth, very tense, and non-adherent. The Casoni intradermal test will help to diagnose it from other cystic swellings in this region, particularly as in this type the complement fixation test is often negative. Daughter cysts are present in most of the hepatic cysts of the adult. All daughter cysts in the adult are probably pathologically complicated and some leakage has occurred. This must be since a great number of them are bile-stained, and in many cases there are vague symptoms directing the attention to the liver; also some history of anaphylactic symptoms can be elicited. Pain is rare; if present it may be due to rupture and the passing of hydatid débris down the ducts.

Gastric symptoms are very common; nausea, distension, and occasionally vomiting, so-called indigestion, may be the only complaints. Jaundice is rare unless complicated or actually involving the porta hepatis. Subdiaphragmatic cysts are latent, due to their hidden position, but 75 per cent of hepatic hydatid cysts are inferior and will show a rounded cystic tumour, visible or palpable. The swelling is continuous with the liver, moves with respiration, and is dull on percussion. Hydatid fremitus, although often mentioned, is rare, and depends on daughter cysts with definite degrees of tension within the adventitia.

The differential diagnosis will change according to the anatomical position of the cyst, if antero-inferior or superior, etc. I shall not enlarge upon that, because if one thinks about it, he will prove or disprove it.

If small, some foreign protein manifestation may pronounce itself, urticaria, pruritus, if in a hepatic duct jaundice may be present. The differential diagnosis changes with the state of rupture. Cholelithiasis is a common error, pleurisy may be another. Intraperitoneal rupture is commonest in young subjects due to the tenuity of the cyst wall at this age.

Primary pulmonary cysts occur in about 10 per cent of all cysts in the adult and may undergo spontaneous cure by rupture into a bronchus. A cough and hæmoptysis in the relatively young makes one suspect tuberculosis. The x-ray picture, however, is usually characteristic. Cysts of the brain are due to blood-borne hexacanth embryos. Infection is common in children due to the relatively large size of the carotids, secondary cysts which are metastatic and multiple are peculiar to the adult. They, like all brain tumours, produce localizing signs and call for modern methods of diagnosis. Cysts of the spleen, kidneys and bones have been described—the frequency of involvement of the various organs, I have already mentioned.

Ecchinococcus alveolaris, which has a small geographical distribution and shows a very different pathological picture, and is very rare, as there is but one case published in Australia, and it may be a different parasite—the liver is the commonest affected organ, and is so extensive that operation is impossible and the prognosis grave.

TREATMENT

The tendency for complications to occur increases as these cysts enlarge—and operation should be advised except where the cysts are found to be dead or quiescent—in this type of case, operation is often followed by persistent sinus formation, due to introduction of quiet infection. Radiotherapy has no effect on the cyst, and due to the small exchange of fluid between the host and parasite, intravenous therapy is of no avail, even if one brought about death of the cyst, complications in the way of infection could still occur. Treatment then consists of free exposure by the most direct route, (S. Tisserand and P. Baufle[5] in "Académie de Chirurgie", June, 1938, conclude that anterior hydatid cysts of liver, with central necrosis are the ones which do best if properly drained) even in two stages if necessary to prevent pleural contamination, which is a real danger. If the cyst is simple and clean, one should use formalin to kill the scolices which are a potential danger in the field of operation. Drainage is not always necessary, if in doubt, then do leave a drain. The laminated membrane should be removed, also the contents of the cyst.

I shall now give the case histories in table form of the patients who were admitted to the

CASE HISTORIES

Case	*Age*	*Sex*	*Nationality and occupation*	*Complaints and duration of*	*Eosinophiles*	*Signs*	*Location of cyst*	*Operation*	*Condition on discharge*
No. 1 Z.V. 1909	28	M.	Italian farmer	Pain in abdomen		Abdominal swelling for at least 15 years	Liver	Drainage and evacuation	Sinus
No. 2 A.T. 1921	47	M.	English butcher; handled infected cattle	Indigestion, biliousness for 20 years		Lump in hypochondrium, 10 years	Liver, anterior surface	Drainage	Small sinus
No. 3 R.M. 1922	10	F.	Russian	Pains, vomiting, fever	2%	Mass in right hypochondrium	Liver; multiple	Enucleation and packing	Apparently cured
No. 4 M.S. 1925	21	F.	Russian. His people kept dogs, sheep and goats	Lump beneath right costal margin, noticed 6 months; larger recently, with loss of appetite	3%	Mass in right hypochondrium	Liver	Enucleation	Wound healed
No. 5 J.B. 1925	32	M.	Australian; boyhood on a sheep station	Swelling in epigastrium one year. In 1917 after injury, operation on cyst of liver	4%	Lump in hypogastrium and pelvis by rectal examination	Pelvis and liver	Removal of pelvic tumour	For return for liver enucleation
No. 6 N.Z. 1934	33	M.	Ukrainian	2-3 months; intracranial pressure	3.5%	Same	Cisterna magna	Suboccipital craniotomy. Removal of the cyst	Died
No. 7 Mrs. A.F. 1935	53	F.	Alsace Lorraine	1. Eructations of gas, p.c. 2. Regurgitations. 3. Heavy feeling in epigastrium		Tenderness in mid-epigastrium. X-ray showed calcification. Casoni test, positive	Liver	Not investigated further	
No. 8 M.P. 1935	55	M.	Greek	'28, Pain in right abdomen. '29, Hæmaturia. '31, Pain, lump, lower abdomen.		Liver enlarged	Liver, spleen, bladder		Died of tuberculosis
No. 9 E.W. 1935	54	M.	?		9%	Tenderness increased in right upper quadrant; resistance	Liver		Died from coronary thrombosis
No. 10 J.B. 1938	44	M.	Czecho-Slovakian	Pain right upper quadrant; constipation; loss of weight; pain in right chest and shoulder	3%	Tenderness, rigidity in right upper quadrant; fever	Liver	Removal and drainage	Sinus

Montreal General Hospital with hydatid disease since the year 1906 as they appear in chronological order. The data are not complete, but there are enough to warrant the conclusion that hydatid disease is sufficiently common in Montreal that one should think of it in obscure cases of enlarged liver. None of our patients has been American-born. There is usually some form of indigestion, and in most cases the cyst can be palpated. Eosinophilia is a factor, drainage and evacuation of the cyst is the treatment of choice, and in our few cases the only immediate mortality was one case, in which the cyst was in the cisterna magna.

REFERENCES

1. HENRY, C. K. P.: Hydatid disease, *Montreal Med. J.*, 1906, **35**: 92.
2. BARNETT, SIR L.: Hydatid disease, *New Zealand Med. J.*, 1938, **37**: 188.
3. GUIBAL, P.: La ponction exploratrice des kystes hydatiques du foie est dangereuse, *Petites Cliniques de la Presse Medicale*, 1938, **46**: 1059.
4. EMBREY, M. P.: Pelvic hydatid cysts and obstructed labour, *Brit. M. J.*, 1938, **2**: 1201.
5. TISSERAND, G. AND BAUFLE, P.: A propos de deux nouveaux cas franc-comtois d'échinococcose alvéolaire, *Mém. Acad. de Chir.*, 1938, **64**: 1018.

EXTRA-HEPATIC TUMOURS OF THE BILIARY TRACT*

BY CHARLES K. P. HENRY

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JAUNDICE, even today, is often considered to be a disease rather than a symptom. It is really a signpost on the biliary highway, indicating that the route is blocked and a detour is being used for the bile to travel. When this sign is up a new route must at times be constructed, and the operating surgeon may be faced with greater difficulties than many a highway engineer.

This yellow sign may denote obstruction anywhere between the liver cell and the papilla of Vater, where the smoothly paved biliary route reaches the great trans-human highway of the gastro-intestinal tract. We are not interested now in the forms of jaundice that originate proximal to or in the liver cell, hæmatogenous or hepatogenous. Our biliary route will today also traverse a ten-year period, 1929 to 1938 inclusive, through the clinical and pathological records of the Central Division of the Montreal General Hospital.

Study of the clinical records has impressed me with the frequent lack of a diagnosis of the cause of the jaundice when the patient was referred to hospital; and, in hospital, with the appalling frequency with which obstructive jaundice is due to carcinoma, especially carcinoma of the head of the pancreas. A study of the hospital records, both clinical and pathological, covering the gall bladder, the biliary ducts, and the head of the pancreas, reveals certain findings that may be of value to practitioners, hospital clinicians and surgeons.

The pathological records include the surgical pathological specimens obtained at operation, by biopsy, or, in the case of the gall bladder, by removal of the organ, and the records of those cases which came to autopsy. Biopsy specimens include gland, omentum, peritoneum, liver, etc., and were multiple in some cases. In the case of the clinical records many diagnoses are based entirely on clinical findings.

The records are quickly visualized in the form of tables.

TABLE I.

THE MONTREAL GENERAL HOSPITAL
CENTRAL DIVISION
1929-1938

Tumours of the Gall-bladder

Clinical records		*Pathological records*
	Benign	
1	Adenomas	5
1	Papillomas	2
0	Polyps	1
1	Myomas	1
	Malignant	
	Papillomas	1
11	Papilliferous carcinoma	1
	Scirrhous carcinoma	2
	Adenocarcinoma	9
14		22

TABLE II.

Tumours of the Extra-hepatic Bile Ducts

Clinical records		*Pathological records*
	Benign	
1	Papillomas	2
	Malignant	
3	Adenocarcinoma	8
*36	Carcinoma of the pancreas involving the common bile duct	10
0	Carcinoma of the ampulla of Vater	1
1	Carcinomatous cyst of pancreas	0
41		21

* Clinically, it is uncertain in a few cases whether a stone in the pancreatic portion of the common duct or a tumour was responsible for the mass felt at operation. Some of these patients left hospital more or less improved; some of them died and no autopsy was obtained.

TABLE III.

2,768 autopsies (1929-1938)

Tumour of the extra-hepatic biliary system:

	Percentage
Including those of the pancreas	0.01
Excluding tumours of the pancreas	0.007

TABLE IV.

	Percentage
Total number of carcinomas at autopsy	45.6
Percentage of carcinomas of the extra-hepatic biliary system	3.8
Ratio of those of the gall-bladder to those in the ducts was 220:90. (Mayo Clinic reports 212:100).	

It was found impossible to make an accurate statement regarding the number or the percentage of cases of gall-bladder carcinoma that were associated with gall stones or with previous attacks of cholecystitis.

In the three cases of carcinoma of the gall bladder that I have seen stones and cholecystitis

* Read at the Seventieth Annual Meeting of the Canadian Medical Association, Section of Surgery, at Montreal, on June 22, 1939.

occurred in all, and in two cases the gall bladder had been emptied of stones and drained several years before. We may safely conclude from the histories that chronic inflammation of the gall bladder was a definite precursory factor in a considerable number of these cases of gall-bladder carcinoma.

Our pathological records show that there were 820 gall bladders *removed* in the period under review, and of these, 15, or 1.8 per cent, were removed for tumours of the extra-hepatic biliary system.

Cutter states that 1.4 per cent of all operations on the gall bladder showed carcinoma. Our pathological records show 8 females and 3 males with carcinoma of the gall bladder, and our clinical records give 10 and 4 respectively. These figures are in keeping with the incidence of gall-bladder disease in females and males, *e.g.*, 3 to 1. In our series there were 25 females and 35 males. The youngest was 34 years and the oldest 83 years. Six patients were 40 years or younger; but 52 of them, or 87.3 per cent, were over 50 years of age.

The clinical case records show 14 patients in which carcinoma of the gall bladder was diagnosed. There were 38 patients in whom a diagnosis of carcinoma of the head of the pancreas with obstructive jaundice, was made. In addition, clinically, there were 3 cases of carcinoma of the cystic, hepatic, or common duct diagnosed at operation. The 36 listed cases include two which might well have been stones impacted in the pancreatic portion of the common duct.

On the whole, it is fair to conclude that in the Central Division of the Montreal General Hospital, a 400-bed hospital, each year there are 5 or 6 patients with obstructive jaundice due to carcinoma in the extra-hepatic biliary system. In a year there are about 103 operations on the biliary tract, so that there is a surgical incidence of about 6 per cent of tumours of the biliary tract outside the liver.

Symptomatology. — Briefly, jaundice is the main symptom, present in 44 of the 60 patients, or 73.3 per cent. It was either an initial symptom or it occurred shortly afterwards. The most common sequence of symptoms noted was malaise, loss of strength, loss of weight, of energy and of appetite. Nausea and vomiting occurred much less frequently than in cases of cholecystitis and stone.

The period of illness prior to admission to hospital ranged from one day to one year, although quite a number, 9, had a longer history due to the presence of cholelithiasis and cholecystitis prior to the onset of the terminal disease.

The characteristic symptom was the onset of painless jaundice, often noticed by the friends or relatives before the patient was aware of it.

In a few cases attacks of typical gall-stone colic preceded by days or by weeks the appearance of jaundice, and some of these were operated on because of a diagnosis of stone and cholecystitis or obstruction from stone, or inflammatory swelling and œdema. At operation the outstanding feature seems to be a large distended gall bladder, hard and nodular in case of carcinoma of the gall bladder, usually soft and enormously distended when the lesion is in the head of the pancreas. In fact, a distended gall bladder at operation, in the absence of a stone impacted in the cystic duct or ampulla, calls for a most careful search for tumour in the common duct or pancreas. Before operation a palpable gall bladder in a patient of over 50 years in whom jaundice has come on insidiously is a most significant sign and one that points to carcinoma.

At operation the gall bladder should not be removed if there is the slightest doubt as to the cause of the obstructive jaundice. In our series the short-circuiting operation has been employed in 19 patients, and has been of undoubted value. Several patients have lived months in comfort and free of jaundice, one over 11 months before liver metastases brought on a recurrence of jaundice. Thirteen had a cholecystgastrostomy, of whom 10 left hospital alive, some quite well. Six had a cholecystenterostomy, of whom 2 left hospital alive. It would appear that an early cholecystgastrostomy offers a very definite period of well-being to the patient with obstructive jaundice due to tumour.

TABLE V.

60 Cases of Extra-hepatic Tumour

14 did not have jaundice
2 reports are inconclusive
44 had jaundice.

TABLE VI.

19 Short-circuiting Operations

Cholecystgastrostomy	13
10 left hospital alive, *i.e.*	77 per cent
Cholecystenterostomy	6
2 left hospital alive, *i.e.*	33-1/3 per cent

Forty-four operations were performed on 40 of the 60 patients, that is, 2/3 of all patients in this series were operated on.

In no case was a Whipple operation done, though in one or two instances the records would seem to justify such a radical operation. The positive diagnosis of carcinoma of the head of the pancreas, the cause of obstructive jaundice, is nearly always made from within the abdomen by the operator by feel, not, pathologically, by biopsy. Consequently cholecystgastrostomy and gastro-enterostomy of Whipple's first stage will be indicated most infrequently and only to the most experienced surgeons.

Cholecystgastrostomy, with a subsequent radical operation for removal of the pancreatic tumour, will be possible only in a few cases.

Tumours within the ducts should be removed wherever possible, as intra-ductal tumours appear to metastasize later and less widely than do pancreatic tumours. One of the latter in this series metastasized to the cervical lymph nodes of the right side which were removed surgically before there was any indication of the original site. Cancer of the body or tail of the pancreas produces jaundice only by liver involvement, very seldom by pressure from enlarged glands.

Diagnosis and prognosis.—The diagnosis of gall-bladder tumours may at times be made by x-ray and dye visualization, just as we do in stone or cholecystitis. Non-filling by the dye, poor concentration, slow emptying, filling defects, especially when close to the wall, may clearly indicate, or at least suggest, papillomatous growths in the cystic duct, in the gall bladder, or tumours arising from the walls of the latter. Adenomas and fibromas of the wall may be diagnosed, and filling defects may indicate new growth even early enough for the successful removal of even a carcinomatous gall bladder. When jaundice has occurred the carcinoma has involved the ducts, the liver or adjacent lymph nodes, and a cure is impossible.

Evidence of any pathological condition in the gall bladder should be enough to warrant operation. The association of gall stones and cholecystitis in cancer of this organ may be fortunate, as it leads to early operation. An abnormal gall bladder calls for operative removal.

In a series of 16 cases of carcinoma of the gall bladder Kirklin by the use of the dye showed that—

TABLE VII.

Kirklin's Series — 16 Cases

13 of these failed to show concentration of the dye or a filled gall bladder.
7 showed gall stones.
1 showed a normal dense shadow and no filling defect.
1 showed normal filling and multiple stones.

In our series of 60 cases 10 gall bladders contained stones or showed chronic cholecystitis.

Papillomas are the most common of gall bladder and ductal growths. In a series of 17,000 gall bladders removed at the Mayo Clinic 8.5 per cent contained papillomas.

As far as I can ascertain, in our hospital there has been no case of cure of carcinoma of the gall bladder.

In cases of long-standing incomplete obstructive jaundice, or of complete jaundice of short duration, the usual grave complication of hæmorrhagic lesions was a quite frequent finding, and hæmorrhage was responsible for death in cases unoperated on, as well as following operation, in spite of the various precautions that were taken.

Several patients were operated on for other conditions during the period of ill health before the onset of jaundice. One patient underwent an operation for bilateral hernia three months before he died of carcinoma of the pancreas with metastases to the common duct, duodenum and various skeletal bones. This operation was performed seven months after the onset of vague abdominal distress. In two other cases operative procedures were carried out which proved to be incorrect in the face of the final lethal condition.

I have never seen a carcinoma of the gall bladder that was removable at time of operation. My plea would be for cholecystectomy in every case rather than cholecystostomy, unless the added risk of the former operation be too great. Also, it must be obvious that in patients over fifty years early operation should be urged in the presence of symptoms referable to the biliary tract. Only in this way may we hope to deal with new growths early enough to save some of these patients.

CONCLUSIONS

1. The onset of painless jaundice in a patient over fifty years, with few exceptions means carcinoma of the head of the pancreas. Pruritus frequently precedes jaundice in such cases.

2. Repeated attacks of colic or of transient jaundice in a patient free from these for some years is suggestive of malignant change and calls for an exploratory operation.

3. Any operation on the gall bladder should be undertaken only by a surgeon who is prepared to deal with tumour as well as stone.

4. For obstructive jaundice due to non-removable tumour in the lower ductal system, cholecystgastrostomy appears to offer the patient the longest period of well-being and freedom from cholæmia.

5. A hard mass felt in the head of the pancreas in a jaundiced patient may be a stone, even when thought otherwise by the operator. A short-circuiting operation in 3 cases relieved the jaundice and the patient remained well. One of mine is alive after five years.

6. A fibrosing pancreatitis may simulate tumour and produce jaundice.

7. Diabetes occurred but seldom in the 60 cases, while a mild hyperglycæmia was a fairly common finding.

I desire to express my thanks to Dr. G. A. Holland, Clinical Assistant in Surgery, and to Dr. W. O. Rothwell, Senior Interne in Pathology, for their assistance in compiling the clinical and pathological data on which this presentation was founded.

THE SELECTION OF ANÆSTHESIA FOR UPPER ABDOMINAL OPERATIONS*

BY C. C. STEWART, M.D.

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THE conclusions on which this paper is based have been drawn from a review of 288 operations on the upper abdomen performed in the Montreal General Hospital during 1938. This type of operation constitutes probably less than 5 per cent of the total number requiring general or spinal anæsthesia in the average hospital. In spite of this small proportion, numerically, every anæsthetist of experience recognizes the difficulties and dangers inherent in this field. Apart from the rather infrequent procedures on the brain and within the chest wall, no other type of operation involves such important structures and nerve centres as are met with in biliary tract and upper gastro-intestinal surgery. Every anæsthetist has observed the promptitude and certainty of the development of surgical shock in the anæsthetized patient following the manipulation of the upper abdominal viscera, either by undue traction or by tight packs impeding the free excursion of the diaphragm. It is inevitable that this condition contributes towards the immediate exhaustion of the cardiac reserve, and fair to assume that it will not enhance the post-operative comfort and convalescence of the patient. In the choice of the anæsthetic, therefore, nothing, apart from considerations of safety, must allow us to lose sight of the ideal of adequate abdominal relaxation. It is probable that the added risk incidental to this type of operation on the obese but otherwise sound patient arises from the effects of the more vigorous efforts necessary to obtain proper exposure.

In the not so far distant past our choice of anæsthetic was distinctly limited. In the past ten years, to ether was added spinal anæsthesia and more recently, cyclopropane. It is to these three agents that my remarks are confined. In the administration of the inhalation anæsthetics we have always believed that the use of the endotracheal method gave most satisfactory results for this type of operation, and have put this into practice for many years. This technique gives almost complete control of respiratory function, the bugbear of all inhalation anæsthesia. The degree of anæsthesia may be kept at a uniform level or varied to meet varying operating conditions. Mucus or saliva in the upper air passages or the oro-pharynx is of little moment and can be suctioned off at will. Even regurgitation of stomach contents does not interfere with the respiratory exchange. With the closed endotracheal circuit technique, extreme economy of gases or ether is obtained, and the danger of explosion is reduced to a minimum.

In a discussion on the selection of different anæsthetic methods the preference of the individual surgeon must always be taken into account. His preference has probably been

* A paper read at the Seventieth Annual Meeting of the Canadian Medical Association, Section of Anæsthesia, Montreal, June 21, 1939.

based on an extensive experience of surgery with different forms of anæsthesia, and it is perhaps unwise to attempt to influence him unduly. It is our privilege to be consulted frequently in what might be called problem cases, both by the surgeon and the medical consultant, and here we are justified in giving an opinion and expecting it to be listened to.

In these days of a medically-conscious public the patient also has his or, more often, her, views concerning anæsthesia. This point, naturally, is not to be stressed, but if the co-operation of the patient will in the opinion of the surgeon and the anæsthetist be of any value it might perhaps receive some consideration. A patient demanding complete oblivion during an operation for cholecystectomy would obviously not be a suitable subject for spinal anæsthesia.

The use of pre-operative medication in this type of operation is not of great importance. We do not require, nor do we desire, profound and lasting sedation. Very often the age of the patient, his physical condition, and the shock resulting from the operation prompt us to prescribe these drugs in minimal dosages in order that post-operative resuscitative measures, if necessary, may exert their full effect. The use of avertin pre-operatively, however valuable in other types of surgery, has no place in the gastro-intestinal and gall-bladder regions. The records of most hospitals will prove this. The patient is usually the individual most in favour of this particular medication. Nembutal is an uncertain drug and its dosage, in patients over 60 years of age, may well be limited to one capsule of gr. 1½. In the preparation for spinal anæsthesia morphia may be either freely used or its use may be deferred until the patient shows signs of uneasiness or actual discomfort during the later stages of operation.

The standards on which the values of an anæsthetic must be judged are, firstly, its ability to enable the surgeon to perform an operation safely and successfully, and, secondly, that convalescence and ultimate recovery be not impeded or delayed by any toxic effects which might be directly or indirectly attributed to the anæsthetic agent itself or the technique of its administration. Comparison of the post-operative morbidity and mortality in this relatively large series shows remarkably uniform results for the three groups of anæsthetic methods.

TABLE I.

	Endotracheal ether 119 cases	*Endotracheal cyclopropane 63 cases*	*Spinal 106 cases*
Pneumonia.....	8 (6.7%)	7 (11%)	7 (6.5%)
Upper respiratory infections.....	6 (5.0%)	....	....
Vomiting 24 hours.	18 (15.1%)	1 (0.5%)	6 (5.6%)
Died (all causes)..	13 (11.0%)	5 (8.0%)	12 (11.0%)
Average days in hospital.....	21	21	23

The admittedly increased toxic action of ether in high concentration on the liver and kidneys has been manifested mainly in an increased tendency to nausea and vomiting. In other respects the routine anæsthetic procedures as cited here have not shown any remarkable variations in their effects. Certainly, we can lay no claim that the more serious post-operative pulmonary infections have been modified to any extent by any one method. In spite of its admittedly disagreeable effects, ether by the endotracheal method still continues to fill a large proportion of our anæsthetic requirements in upper abdominal surgery. In a large hospital all anæsthetists cannot be of the same degree of competency, and we feel that here is an agent and method with a large margin of safety, with the varying levels of anæsthesia clearly defined and readily observed. Incidentally, the free access which the method provides to the face of the patient renders it an ideal method for instruction in the signs of anæsthesia. It is purely an insufflation form of anæsthesia and does not aim to provide more air than is sufficient to act as a vehicle for the ether. A No. 24 or 26 French catheter is large enough. A Guedel rubber airway is usually inserted to ensure a free supplementary airway. The mouth is thus made available for suctioning of secretions or to pass a stomach tube without interruption of anæsthesia. Induction with gas oxygen over ether proceeds as rapidly as possible, the catheter being passed through the mouth and connected to the ether pump. Relaxation is usually complete by the time the peritoneum is ready to be opened, and the patient is kept in the second plane of surgical anæsthesia until all manipulations necessary to expose the stomach or gall bladder are completed. The

anæsthesia is now deliberately lightened by reducing the proportion of ether in the pumped air, and increased in depth some minutes before closure of the peritoneum.

On account of the almost completely "open" character of the administration, respiratory movements are usually greatly reduced, and a "quiet" abdomen, comparable to that of spinal anæsthesia, obtains. As the superficial layers are being closed the ether is shut off and a small quantity of CO_2, sufficient to produce distinct hyperpnœa, is added to the insufflated air. De-etherization is greatly advanced by this method in a very few minutes following even two hours' anæsthesia. At this stage a stomach tube may be passed and the stomach washed out with warm water. Some surgeons claim that their patients are more comfortable following this procedure.

Endotracheal ether has been used in subtotal gastrectomy following perforated ulcer as well as in the elective type of surgery, and does not seem to have been responsible for any undue post-operative morbidity or mortality as compared with other agents. We feel that this is a valuable method of anæsthesia applicable to all occasions where the use of ether is not contraindicated, possessing itself a wide margin of safety, and simple enough in its management, technically, to be within the powers of any conscientious anæsthetist.

The management of upper abdominal surgery with cyclopropane as the sole anæsthetic is still a debatable subject. It is definitely not a method for the tyro, and that for several reasons. It is one of the few anæsthetics now in common use which appear to have a selective action on cardiac rhythm, even in the presence of a physiological sufficiency of oxygen. Its general acceptance has been retarded in some parts by reports of fatalities where the patient expired in what was apparently ventricular fibrillation. It is unsuited for the comparatively inexperienced anæsthetist who is accustomed to rely on the classic signs of ether anæsthesia, where a more or less well defined stage of excitement is succeeded by an easily controllable state of surgical anæsthesia, with its characteristic signs of muscular relaxation, automaticity of respiration, regular cardiac rhythm, and, most informative of all, changes and modifications of corneal and pupillary reflexes. As experience with cyclopropane increases, however, and confidence grows, the competent anæsthetist realizes that he has at his command, in most cases, an almost ideal anæsthetic. The ease and speed of induction, the potency of the gas, the stimulus of the abundant oxygen content and the rapid emergence, constitute a revolution in inhalation anæsthesia. Some extra co-operation from the surgeon will be required, and sometimes requests for more relaxation will be made. The temptation to concentrate the gas beyond accepted safe limits must be sternly resisted. A few cubic centimetres of ether will accomplish the desired effect and no harm done. Unaccountably, cardiac arrhythmia will sometimes appear, tachycardia, or bradycardia, and will as unaccountably vanish after a spurt of oxygen into the bag. With the closed circuit system and CO_2 absorption the gas may be turned off a few minutes after surgical anæsthesia is attained, or a continuous trickle of from 30 to 50 c.c. per minute be maintained if the bag tends to deflate. Three hundred c.c. of oxygen per minute suffices for the average case. Carelessness and inattention have no place in the administration of this gas. Fatal results are probably the fault of the anæsthetist and not the anæsthetic. It is probably a wise policy not to let the hand leave the control when adding the gas during the progress of the operation. Satisfaction and success with this anæsthetic increase only with experience.

Spinal anæsthesia for the type of operation under discussion can be either a great success or a dismal failure. To produce less than a perfect result is mental anguish to the surgeon and physical anguish to the patient. Surface analgesia should extend to the fourth rib. Inadequacy of height or duration of analgesia cannot be glossed over with the proverbial whiff of gas, but must be tackled by producing as full surgical general anæsthesia as if the spinal had not been given. Before the advent of pontocain and nupercain this was all too common except with the unusually rapid operator.

The preference for spinal anæsthesia has been mostly that of the surgeon who, once accustomed to the benefits of the profound relaxation produced, will not be satisfied with less. Pontocain glucose solution and nupercain with the Howard-Jones and Etherington-Wilson techniques have both given satisfaction. The pontocain induc-

tion is less time-consuming. Contraindications are few, the obvious ones being hypertensive and hypotensive conditions and, above all, shock. Individuals temperamentally unsuited may be given light gas anæsthesia throughout the whole course of operation with satisfaction. If supplementary anæsthesia becomes necessary while the abdomen is still open all surgical activity must cease until induction is completed. Gentleness in handling abdominal contents is most essential under this anæsthetic, and great distress and shock will result from rough manipulation. If it is thought desirable to administer oxygen to combat pallor or shock the patient is sometimes grateful if light gas or cyclopropane anæsthesia is introduced. For some reason spinal headache is almost unknown following high anæsthesia, there having been only one case in this series.

In summing, up I feel that each of these methods of anæsthesia has its own place, that a variety is necessary to suit the varying needs of the patient, the surgeon and the anæsthetist, and that the comparative uniformity of clinical results justifies their retention in our armamentarium.

I wish to acknowledge the assistance of my staff in investigating the case reports included in this series.

CHILD CARE DURING WAR*

BY ALAN BROWN, M.D., F.R.C.P.(C.)

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THE child is the best and most lasting asset of the State, and undernutrition or defects either in time of peace or war are unfortunate.

Child care during war should not differ from that during peacetime, provided thorough work was being done; there is however, the greater urge during an emergency which often exposes palpable defects in our systematic care of children. The child has always been the ward of the State, and a government must assume this care not only during peace but more especially in time of conflict.

During the last 25 years great progress has been made in child care in all civilized communities where special efforts were put forth. For instance, in Toronto in 1914 the infant mortality was 155 per 1,000 births, and 49.0 per 1,000 births at the end of 1938.

How important it is that this work not only be continued but improved may be gleaned from the following facts. In estimating the loss to Europe on account of the lower birth rate in consequence of the last war it must be borne in mind that as a regular phenomenon birth rates are decreasing all over the world. The calculation of the decrease caused particularly by the war must consequently be made very carefully. It seems justifiable however to assume that Great Britain and Ireland in this way have lost 600,000 who would have been born if no war had taken place; France over a million, and Italy 1.3 million.[1] These three powers have thus lost 3 millions. For Germany the deficit is 2.9 millions. Bearing in mind that the effect may have been just as great in several other belligerent nations, such as Russia and the Balkans, we may be justified in assuming for Europe a deficit of many millions of births, and, even after making a proper deduction for infant mortality, the loss has been about equal to those lost on the battlefield.

The factors that determine the population of any country are the number of children born into it; the number of people who die in it; the number of people who go out of or come into it. Therefore, to prevent a decrease in population and to maintain an increase—the goal of every nation—it is necessary to have a high birth rate and a low death rate, and to successfully encourage desirable immigration.[2]

Through increased governmental activity and more especially through the establishment of many volunteer welfare agencies, the nations have been endeavouring to compensate for the lowered birth rate by saving the lives of babies under one year of age—a period of life in which the death rate is high and in which the diseases causing the death rate are largely preventable, and this remark applies to most conditions in childhood.

* Read at a luncheon meeting of the Dominion Council of Health, Ottawa, October 12, 1939.

To quote Hamill:[2]

"At the beginning of the last great war, as would naturally be expected, the interests of the people and their governments were centred on problems that were directly connected with the development and maintenance of their armies. The result was that the problems of civil life were neglected. The welfare agencies that were dependent for their existence upon the voluntary effort and contribution of the people lost both their workers and their finances. The contribution to war loans, the maintenance and carrying out of the work of institutions, such as the Red Cross, left the ordinary private agencies of civil life stranded. The withdrawal of physicians and nurses trained and working on public health problems handicapped the activities of governmental institutions. Some private agencies went out of business, all of them curtailed their work, the governmental departments became less efficient, as a result of which sickness and death among infants and children increased by leaps and bounds. This experience was common to all belligerent countries."

In short, the various nations found themselves facing the solution of these problems: (1) a decreasing birth rate; (2) an increasing death rate; (3) an appalling destruction of adult life on the battlefield; (4) a great maiming of men, thousands of whom were totally incapacitated. What was to be done? There was but one possible way of stemming the tide of destruction and that was by reducing the infant and child mortality and morbidity, as it was manifestly impossible to control the destruction on the battlefield. To this end governments bent their energies with some measure of success.

By what procedures were these successes brought about? The basis of all health work is education. England at this time was able to reduce her infant death rate from 110 per thousand to 91 in a single year. The government financed every private agency of standing, and multiplied their health visitors so that they had one to every 500 children born.

Before it is too late, let us learn from our allies the lesson of the importance of the child.[3] Sir George Newman, formerly general medical officer of health for Great Britain, said that as a general procedure it may be said that "a state cannot effectually insure itself against disease unless it begins with its children", and as a result of his experience during the years 1915-18 he outlines the necessity of the care of the child in a manner that we may well follow.

"The European war has given new emphasis to the importance of the child as a primary national asset. The future and strength of the nation unquestionably depend upon the vitality of the child, upon its health and its development, and upon its education and equipment for citizenship. Great and far-reaching issues have their origin and some of their inspiration in him. Yet in a certain narrow sense everything depends upon his physique. If that be sound we have a rock upon which a nation and a race may be built; if that be impaired we lack that foundation and build upon the sand. It would be difficult to overestimate the volume of inefficiency, of unfitness and suffering, of unnecessary expenditure, and of industrial unrest and unemployment to which this country consents because of its failure to rear and educate a healthy, virile and well-equipped race of children and young people. There is no investment comparable to this, no national economy so fundamental; there is also no waste so irretrievable as that of a nation which is careless of its rising generation. And the goal is not an industrial machine, a technical workman, a "hand" available merely for the increase of material output and the acquisition of a wage at the earliest moment, but a human personality, well grown and ready in body and mind, able to work, able to play, a good citizen, the healthy parent of a future generation. If these things be true, and I believe they are, no reconstruction of the state can wisely ignore the claims of the child."

Food is essential to the growing child.[3] If adults must restrict their diet, let them do so as a war necessity. For the child there should be no restriction. If it is impossible, and it certainly is impracticable, to make any widespread changes in the home conditions and readjust all of the social and economic factors that have resulted in this problem, it is not an insurmountable difficulty to meet the problem if we act from the community point of view. Two methods are open for immediate action: First the establishment of community centres where mothers may be taught how to adjust the family income to the food needs of the growing child and just what foods to buy. Classes should be held in simple cooking, and lessons given in regard to well-balanced diets which meet the needs of the children. Second, the community may come into more direct contact with the child by the establishment of canteens for children, or by organizing school lunches, where an adequate well-balanced meal each day for each child in the community can be provided. These lunches or canteens should not be a charity. Each meal should be paid for by the child, and meals should be given freely when necessary.

In establishing work of this kind, it is realized that communities are very slow to take the initiative, and it is probable that private organization will have to do the work in many places before the state can be made to realize its own obligation. As rapidly as possible, however, this feeding of the children should become the function of the government. This work should not be confined to our large cities. If the canteen is impracticable in small towns, instructions in regard to home feeding of children can usually be carried out with little difficulty. The work of conserving the health of our children should

be universal. It is war work of the first importance.

Putting aside all humanitarian impulses, if it is possible, and, viewing the matter from the coldly practical point of view, there can be no question that the matter of combating this condition of undernourishment of children is an immediate duty of our country; it is a war measure second in importance only to the fighting itself. In fact, our children literally may be considered as our second line of defense. To let anything seriously interfere with their health and development is criminal neglect. In a few years from now it will be too late to repair the damage. At the present time we can do something toward correcting the serious condition that already prevails, and we can surely prevent additional cases from occurring in the future. The question of the health supervision of children should assume in this country a position second only to the fighting forces. We are fighting to make the world safe for democracy, we must also fight to make our children fit to perpetuate this democracy, when it shall have been attained.

Pædiatrics has led the way in preventive medicine. It is hardly necessary to say that most diseases of children are largely preventable if the public will only avail themselves of the opportunities that exist or that the governments make available. For years the Hospital for Sick Children in Toronto has directed its research along the lines of prevention, and I am glad to say it has been crowned with success; such diseases as intestinal intoxication, dysentery, deficiency diseases are all preventable. Diphtheria, smallpox, whooping-cough are preventable through vaccination and active immunization, while measles may be modified and in some cases prevented.

The most important conditions, however, are malnutrition and secondary anæmias which predispose the individual to all other diseases. One never sees a death from a nutritional disturbance now in private practice because the people of the intelligent class know the value of health supervision. This remark should be made to apply to all of our Canadian children.

To quote from an address by F. F. Tisdall.

> "Are all the people of Canada obtaining food which comes up to the Canadian Dietary Standard?[4] In other words is their food adequate for health? The answer is most decidedly no. For instance there has just been completed in Toronto, by the Toronto Committee for Dietary Studies, a study of the food consumption of 100 families in the lower income group. A preliminary report by McHenry shows rather striking deficiences. Only 3 families out of the 100 secured the caloric supply recommended by the Canadian Dietary Standard. The average protein intake for all the families was 77 per cent of the standard, and only 7 per cent of the families had protein intake above the standard. The amount of calcium secured by children in these families was distressingly low, averaging 57 per cent of the standard for young children and 49 per cent for older children. Women need iron in more generous amounts than do men, but the women in these families received only an average of 53 per cent of the standard. This is sufficient evidence for you to realize that malnutrition is an important problem to us in Canada."

Two factors are involved. One is the lack of knowledge of what constitutes proper nutrition, and in this regard I should like to compliment the Committee on Nutrition of the Canadian Medical Association of whom F. F. Tisdall, Director of Research at the Hospital for Sick Children, is the able chairman. Through his efforts the Canadian Life Insurance Officers' Association has distributed over a million copies of a booklet entitled "What to Eat to be Healthy". Posters on what to eat to be healthy will be tried out in some of the schools in Ontario. In this regard it should be kept in mind that our great field of endeavour should be with children, because in spite of anything that is said it is extremely difficult to change your eating habits and mine.

"The other great problem", to quote again from Tisdall, "is to make the protective foods, namely, milk, meat, eggs, vegetables and fruit, available to the poorer classes at a price at which they can afford to buy them. In other words, there is no use our trying to educate the people to feed their children a pint to a pint and a half of milk a day, an egg a day, some meat, two vegetables besides potatoes, and some fruit, with cod liver oil in the winter months, unless the price of these foods is within reach of their purchasing power."[4]

The importance of nutrition cannot be better expressed than in the words of Dr. James S. McLester in his presidential address at the joint meeting of the Canadian and American Medical Associations in 1935: "In the future, science promises to those races who will take advantage of the newer knowledge of nutrition, a larger stature, greater vigour, increased longevity, and a higher level of cultural attainment. To a measureable degree, man is now master of his own destiny where once he was subject only to the grim hand of fate."

From what has been said I think it is reasonably clear what our attitude should be: (1) Voluntary organizations should be encouraged to carry on and if necessary their funds should be augmented by government grants. (2) No new institutions should be constructed or opened as those already existing are able to carry on, and if necessary their personnel may be increased as the work enlarges. (3) Greater emphasis should be laid on the importance of child nutrition through education in homes, schools, newspapers, magazines, and radio. (4) There should be no increase in the price of the essential foods, or of sera, vaccines, etc. (5) More intensive research, and, if necessary, money appropriated by the government to further this purpose.

CONCLUSIONS

"It becomes our duty as citizens to give of our time and our money to the institutions that have been and will be created for the protection of the lives of our children. Let us not add to the results of battle the casualties that will inevitably follow the neglect of these little ones. Canada is now calling to her citizens to see to it that her people are protected in such a way as to make it possible for them to give the best that is in them to the work they are doing, so that the highest efficiency at home may contribute to the efficiency of her armies abroad.

"When Harry Lauder was in Philadelphia in 1918 he said that when he went into the trenches and asked the boys how they were the answer was, 'How are we? Oh, we are all right; but how are the folks at home?'

"Do you believe they want the answer to that question to be that the babies are dying, the children and grown-ups are sick, the efficiency of the workers has been reduced, and the supplies that should come to you will be delayed because the civil population has been neglected?

"Remember what they are sacrificing that we may be saved. It is not alone the giving up of home and loved ones that dwell there, but the supreme sacrifice of life itself."[2]

REFERENCES

1. *Internat. J. Pub. Health*, 1921, 2: 1.
2. HAMILL, S. McC.: *Am. J. M. Sc.*, 1918, 155: 1.
3. BAKER, S. J.: *N. Y. Med. J.*, 1918, 107: 289.
4. TISDALL, F. F.: Address given to Welfare Council of Toronto, May, 1939.

PROBLEMS IN THE CONSERVATIVE TREATMENT OF SINUSITIS*

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IN the conservative treatment of sinusitis the problems which arise are mainly brought about by our failure to prevent its primary cause, the common head cold. Many contributing factors are known, but it is the failure to deal adequately with this primary cause which makes it difficult to avoid over-emphasis of the parts played by secondary factors. Disagreement in methods of treatment arise through over-stress of a particular influence. The critic examining many of the divergent treatments advocated becomes skeptical when the following of exact details is demanded by the proponent to secure results promised.

The securing of proper aeration and drainage has been recognized as of basic importance in all medical and surgical treatment of the sinuses. The defense mechanism of mucus production and ciliary movement to remove infectious material was thought to be hampered by inflammatory reaction about the ostia of the sinuses, and the emptying rate of the sinuses was looked upon as a measurement of the degree of infection. Therapeutic measures were directed towards lessening congestion, establishing free drainage, and increasing aeration of the nasal chambers. Recently, however, there is evidence that the good results of therapeutic procedures do not depend entirely upon these factors.

Bowen Davies,[1] in an investigation of fifty proved and suspected cases of sinusitis in children, injected lipiodol by antrum puncture, and followed the evacuation of the lipiodol by means of x-ray. From his results, he concluded that obstruction of drainage bears little relationship to infection, that the average rate of drainage is not affected or may be actually increased by infection, that the rapid evacuation of the lipiodol proves that the function of the cilia is not affected by infection, as we have been led

* Read at the Fifty-ninth Annual Meeting of the Ontario Medical Association, Hamilton, May, 1939.

to believe, and that, empirically, infected antra are cured by drainage, which nature has already been doing efficiently.

No adequate explanation, based on aeration and drainage, has been put forth to explain the fact that maxillary sinusitis tends to develop on the wide open side of a deviated septum.

In recent studies of the behaviour of the mucous membrane, the most deleterious effect upon ciliary function and streaming of the mucous sheath was found to be due to drying. Ciliary action is greatest and probably most important about the ostia. These areas are protected in nature's scheme of defense, by the middle turbinal body. Proetz[2] has shown that deviation of the septum causes abnormal eddying of the respiratory air and this wide open, concave area, constricted at both ends, causes eddies of air currents to penetrate below the middle turbinate. The eddying effect produced by a vomer spur may explain by its drying action, the common association with eustachian catarrh.

The moistening function of the nose seems to be a balanced mechanism, which Lillie[3] claims is a definite cycle with a period of constriction followed by a period of congestion, during which congestion the glands are filled with secretion, the engorgement holding the fluid within the glands until the phase of shrinkage is reached when the glands empty their content of mucus on the surface of the mucosa. The alternating blockage of the dependent nostril so often complained of by patients lying down he regards as being physiological in origin.

The production of mucus forming the mucous sheath which is propelled into the naso-pharynx is regarded as the chief mechanism in keeping the nose free from infection. Lowndes Yates,[4] in 1924, stated that "the severity of a sinusitis depends upon the power of the mucous membrane to prevent its destruction by inspired micro-organisms, and if the property that mucus possesses of preventing passage of water, and hence of water-soluble toxins, is destroyed, that a progressive increased poisoning by these toxins of the ciliated epithelium occurs; as ciliary paralysis increases in amount the secretion of mucus is paralyzed, and toxins of the organisms are absorbed."

In acute infections, as the serous stage lessens, mucus begins to appear and the patient is generally less toxic. It is customary to assume that minor surgical intervention is safer when the mucus is more abundant, believing that when the muco-purulent stage has been reached the infection is more localized. Furstenberg,[5] in justifying his conservative attitude towards acute sinusitis, cites experiments in which sterile mucus had been added to cultures of virulent organisms which were injected into animals. The addition of the mucus definitely lowered the lethal dose, and he postulates that the presence of mucus enhances the severity of the infection. Certainly it is the general opinion that mucus has no such deleterious action in the nose.

The action of drugs on the mucous membrane is exciting widespread interest and the experimental results upon living cilia have modified medical treatment.[6] Drugs used in oily solution are now in disfavour, for it is obvious that they are not miscible with the mucus clothing the nose. Most of the drugs used having a greater affinity for oil, little transference may be assumed to take place. They are however, of some use as a protective covering over dry areas. The possibility of lipoid pneumonia should be remembered, particularly in children.

The silver proteins such as argyrol have been used empirically for many years for their antiseptic value but they have been shown to have little such action on the bronchiectatic pus, and while 5 per cent solution has little damaging effect on the ciliary motion, it is said to interfere with streaming. That the use of silver salts will be given up is unlikely, as clinical improvement has been noted from such treatment as a Dowling pack.

Distilled water is harmful to the mucous membrane but solutions of normal saline do not interfere with ciliary motion. The vaso-constrictors, such as ephedrine up to 2 per cent, diluted cocaine up to 2.5 per cent and neosynephrin 0.25 per cent, are said not to interfere with ciliary motion. Menthol and camphor solutions not over 0.5 per cent, and argyrol not over 5 per cent do not interfere seriously with the cilia. Mercurochrome definitely slows cilia and adrenalin is injurious even in 1:10,000 solution.[7] Attention has been concentrated upon the effects of these commonly used drugs on the cilia and little has been written of their absorption and effect upon the tunica propria.

Drugs applied about the ostia of the sinuses not only have an effect upon the local mucous membrane, but the vaso-constrictors conceivably alter the supply and return of the blood and

lymph circulation, as it is known that the majority of the blood and lymph supply comes through vessels entering at the ostia and hence may be affected by treatment about the ostia.[8] The volume of blood and lymph supply of the sinuses may be affected also by the action of the sympathetic and the para-sympathetic nerve supply. Ciliary motion is stimulated by action of the sympathetic and retarded by the vago-autonomic. Adrenalin first stimulates; pilocarpine retards; atropine blocks the para-sympathetic and thus causes increased ciliary motion, but this action of atropine is counter-balanced by the dryness occurring from inhibiting secretion. Cooling diminishes ciliary action and Starling states that acid or excess calcium decreases motility; mild alkalinity accelerates the ciliary beat as in the early stage of an acute rhinitis. The practical application of these facts will undoubtedly influence treatment in the future.

Heat has been used empirically in the treatment of sinusitis and has given relief in the acute stages, particularly in frontal sinusitis. The use of diathermy and, later, short-wave diathermy, has been hailed as a cure for sinusitis. It is very doubtful however, whether they have any greater value than other heat-producing agents, such as the infra-red lamp.[9] In practice the results have been disappointing. Possibly its poor record has been due to the technical difficulty experienced in raising the temperature within an air-filled bony cavity.

One of the chief factors in prolongation of sinusitis is thought to be retention of infectious exudates which by their continued presence favour hypertrophy and hyperplasia. Irrigation, to remove these exudates, has proved of great value in certain stages. Fluids introduced will remain for a comparatively long period, dilute exudates, and lessen the irritation they produce. In acute sinusitis irrigations are painful, are of doubtful efficiency, and introduce danger of the complications of osteomyelitis, or systemic infection of the blood stream or kidneys. That these dangers are very real is shown by Furstenberg,[5] who states that 42 out of 58 cases of osteomyelitis of the frontal bone had had operations on acute sinusitis or an acute exaccerbation of a chronic sinusitis.

The question therefore arises: When is it desirable and safe to irrigate during maxillary sinusitis? Opinion is very divergent. Furstenberg discourages irrigation until three weeks have elapsed; others irrigate in the moderately acute stage if the pain is not relieved by shrinkage, rest and sedatives. I believe that irrigations through the natural ostium in maxillary sinusitis are less dangerous and may be used with efficiency in the sub-acute stages. With care and practice up to 80 per cent can be entered without trauma and patients greatly prefer this method.

The patient with acute sinusitis should, if possible, be put to bed, given excess of fluids, nutritional support and general measures to combat the infection. Sulfanilamide should be as useful in this disease as in similar infective diseases elsewhere in the body and is especially indicated when there are complications present.

In the early stages of a sinusitis it is well to remember that inflammation within the nose is the body's method of mobilizing defense forces and that with the diapedesis of the white cells, the mobilization of histiocytes, and the pouring out of fluids, the course of infection is checked. To what extent these forces should be checked is a point to be considered. When a vicious circle is forming, preventing aeration and drainage, mild shrinking solutions such as ephedrine or neosynephrin are helpful. Warm moist air is beneficial to the mucous membrane and steam inhalations have empirically given relief. It is well to remember, however, that excess steam is deleterious, as is evidenced by the atrophy seen in laundry workers.

Most cases of acute sinusitis clear up with little treatment, but with following frequent attacks the mucous membrane changes return to normal with greater difficulty. The sinuses become less patent, with chronic inflammation, œdema, formation of cysts, varying amounts of fibrosis, polyps and periosteal thickening, producing chronicity. There may be decalcification followed by protective sclerosis and thickening of the bony walls.

As the case becomes chronic the question arises: Will conservative treatment effect restitution to normal? and, further, whether a chronic sinusitis which has not responded to medical treatment is of sufficient importance to the patient to demand radical surgery? In the treatment of chronic sinusitis suction irrigations have been advocated by some and have proved efficacious in many hands. The Proetz' method of displacement irrigation has given me satisfactory results in mild chronic cases of ethmoidi-

tis, but must be used with caution, in order not to produce headache, usually due to the use of too much suction.

The rôle that allergy plays in the cause of sinusitis by favouring infection from obstruction, is said to be no greater than in normal people, during the seasonal type of allergy; but it is said to almost invariably cause infection of the sinuses in the perennial type if of too long standing. The explanation of this may be that the seasonal type such as that due to ragweed, occurs during the time when sinusitis is least prevalent.

There is a type of allergy in which the body is sensitized to the infectious organism and Ross Faulkner[10] believed that good results from vaccines are obtained by the desensitization of these cases. Certainly many people have fewer head colds following the use of so-called "cold vaccines".

No specific diet has been found useful in the treatment of sinusitis. However, malnutrition is a factor in the cause and an adequate well balanced diet is necessary. Vitamins in relation to sinusitis have aroused interest, but there is no evidence to show that they are a factor in the average case. The average North American diet has four times the normal requirement of vitamin A, the lack of which has a specific effect upon mucous membranes, causing metaplasia, and keratinization. The lack of vitamin D has been held as the cause of improper development of the sinuses, and in adequate amounts it overcomes improper relationships between calcium and phosphorus. Exposure to sunshine supplements a poor supply of this vitamin. Vitamins, therefore, can be cited as important constituents in the diet, but there is no evidence that an excess of normal requirements confers any immunity.

The endocrine glands are being given an increased importance in the treatment of sinusitis. In hypothyroidism there is a decreased resistance to infection and small doses of thyroid are often useful in the treatment of patients who have low afternoon temperature, dry skin, abnormal fat deposits, thinning of the outer eyebrows, and a lowered basal metabolism. Hypogonadism, occasionally, before menstruation, causes nasal symptoms which abate with its cessation. Small doses of insulin have been advocated as useful in increasing the oxidation of the tissue.

In conclusion: recent studies of the action of therapeutic procedures upon the function of the nose have brought new problems to be dealt with in the conservative treatment of sinusitis.

REFERENCES

1. DAVIES, A. B.: Paranasal sinuses in children, *Proc. Roy. Soc. Med.*, 1938, **31**: 1411; *J. Laryngol. & Otol.*, 1938, **53**: 723.
2. PROETZ, A. W.: Nasal physiology and its relation to the surgery of the accessory nasal sinuses, *J. Laryngol. & Otol.*, 1938, **53**: 716.
3. LILLIE, H. L.: Practical nasal physiology, *Minnesota Med.*, 1938, **21**: 621.
4. YATES, A. L.: Method of estimating the activity of ciliary epithelium within the sinuses, *J. Laryngol.*, 1924, **39**: 554.
5. FURSTENBERG, A. C.: Treatment of acute nasal accessory sinus disease, *Tr. Am. Laryngol. Ass.*, 1938, **60**: 240.
6. PROETZ, A. W.: The effect of certain drugs upon living nasal ciliated epithelium, *Ann. Otol. & Rhinol. & Laryngol.*, 1934, **43**: 450.
7. WATKINS, S.: Medical treatment of pyogenic inflammation of nose and nasal accessory sinuses, *Kentucky Med. J.*, 1938, **36**: 559.
8. PROETZ, A.: Evaluation of displacement method, *Ann. Otol., Rhin. & Laryngol.*, 1937, **46**: 699.
9. COULTER, J. S.: Physical therapy as applied to eye, ear, nose, and throat, *Illinois M. J.*, 1937, **80**: 140.
10. FAULKNER, E. R.: Problems in the diagnosis and treatment of hyperplastic sinusitis and allergy, *Ann. Otol., Rhin. & Laryngol.*, 1938, **47**: 144.

The incidence of angina pectoris is increasing, medical authorities state. It is an affection of the intellectual, not of the labouring class, is more common among men than among women and is most frequent in adult life, although unusual after the age of 45. Lack of adequate rest and insufficient relaxation and diversion are considered as undoubted causative factors in susceptible subjects. Emotional strain and excitement of any kind also are important causative factors. Pain is the one most important symptom. It has as its basis a momentary interference with blood supply to the heart muscle. "On the assumption that coronary spasm (contraction or constriction of the blood vessels of the heart) occurs during attacks and is responsible for anginal pain," Dr. R. B. Raney has designed an operation which, he says, "so far as my experience permits of statements, seems to give uniform relief, not by anæsthesia (loss of feeling) but by prevention of coronary spasm." Dr. Raney's operation interrupts the nerve pathways conveying constrictor impulses to the heart. The operation is performed through an incision made at the upper part of the back, along the spinal column. Eleven patients with angina pectoris have been operated on by Dr. Raney. He says that: "there have been no deaths, and all have obtained complete relief from what had previously been desperate attacks of angina pectoris. The results show what can be obtained even in the face of other major complicating heart disorders."—*J. Am. M. Ass.*, 1939, **113**: 1619.

THE USE OF TRYPARSAMIDE IN THE OPTIC ATROPHIES OF SYPHILIS*

BY S. E. C. TURVEY, M.D.

Vancouver

CADY and Alvis[1] reported in 1926 27 cases of syphilitic optic atrophy, 17 of which were either arrested or improved by tryparsamide therapy. The reports of Lees in 1932,[2] Mayer and Smith in 1934,[3] and Mayer in 1937[4] further supported the view that optic atrophy in itself was no contraindication to treatment by tryparsamide, providing the proper precautions were taken for sensitivity to the drug. Wagener[5] in 1937 states, "In experienced hands tryparsamide may be used safely in certain cases of optic atrophy." Quoting Lees[2] he states that "Tryparsamide rarely, if ever, causes any damage to the optic nerve, if only therapeutic doses are administered and if appropriate measures are taken to prevent a Herxheimer reaction during the first few injections." Dr. S. C. Peterson, of this clinic, has had favourable experiences with this method, and on his advice I decided to use it. Since 1936 a total of 10,195 injections of tryparsamide have been administered in the Neurological Section of the Vancouver Clinic of the Division of Venereal Disease Control to 354 patients suffering from neurosyphilis. Fifteen of these had a moderate degree of optic atrophy. The results of the administration of tryparsamide is the basis of this report. Table I is a summary of the cases.

Thus, 12 of the patients had tabes; only three were females; all but two received twenty or more injections of tryparsamide, and all but three received malarial therapy.

The injections of tryparsamide were given weekly in the following dosage: 1 gram, 1 gram, 2 grams, 2 grams, and then six to eight injections of 3 grams each. After a rest period of one to three months the same course was repeated. The visual acuity, the perimetric fields of vision, and the fundi were examined carefully before treatment was started. The visual acuity and confrontation fields for colour were tested before each injection. The patients were warned of the possible danger of the drug, and also asked to report any subjective visual disturbances. In the 10,195 injections of tryparsamide which were given to the 354 cases of neurosyphilis, these subjective ocular disturbances occurred in 17 cases, in 9 of which they did not recur during subsequent administrations. In one patient the symptoms recurred in a more severe form in spite of smaller doses, but no permanent damage to vision occurred. In only one did serious and permanent visual disturbance result, and this occurred in the form of sudden blindness after the fifteenth injection. Incidentally, pre-existing ocular disease, exclusive of optic atrophy, was present in 14 cases, usually a chorio-retinitis. In none of these

TABLE I.

Diagnosis	*Age*	*Sex*	*Duration of optic atrophy before treatment*	*No. injections of tryparsamide*	*Malaria*
1.*S.A.L. – C.N.S.—Tabes	47	M	Two years	53	Yes
2. S.A.L. – C.N.S.—Vascular	51	F	Six months	25	Yes
3. S.A.L. – C.N.S.—Tabes	47	M	Six to twelve months	30	Yes
4. S.A.L. – C.N.S.—Tabes	56	M	Two years	37	Yes
5. S.A.L. – C.N.S.—Meningovascular	53	M	Two years	38	Yes
6. S.A.L. – C.N.S.—Tabes	54	M	Six months	24	Yes
7. S.A.L. – C.N.S.—Tabes	62	M	Six months	20	Yes
8. S.A.L. – C.N.S.—Tabes	48	F	Six months	24	Yes
9. S.A.L. – C.N.S.—Tabo-paresis	62	M	Unknown	22	Yes
10. S.A.L. – C.N.S.—Tabes	54	M	Unknown	25	No
11. S.A.L. – C.N.S.—Tabes	64	M	Unknown	30	No
12. S.A.L. – C.N.S.—Tabes	40	M	Three months	10	Yes
13. S.A.L. – C.N.S.—Tabes	43	M	Five years	25	No
14. S.A.L. – C.N.S.—Meningovascular	53	F	Three weeks	7	Yes
15. S.A.L. – C.N.S.—Tabes	46	M	Three years	40	Yes

*Syphilis acquired late—central nervous system

* Division of Venereal Disease Control, British Columbia Board of Health, Donald H. Williams, M.D., Director.

cases did tryparsamide cause subjective symptoms or objective ocular damage.

A short summary of the histories of the patients with optic atrophy is given below.

CASE 1

Syphilis, acquired, late, central nervous system, tabes; optic atrophy (unilateral). A male, age 47, was admitted in November, 1936, with a history of some failure of vision in the right eye for two years. Visual acuity, R. 10/200, L. 20/20; right field grossly constricted, left field full; right fundus pallid and flat, left fundus normal. Blood Kahn test was negative; cerebrospinal fluid, 30 cells, protein 60, a positive Kahn and colloidal gold curve "paretic zone".

The treatment from December, 1936, to February, 1939, consisted of 53 injections of tryparsamide (149 grams); 42 injections of bismuth metal (8.2 grams); malaria in January, 1938 (9 chills). February, 1939.—Visual acuity, R. 20/200, L. 20/20; fields unchanged. Blood Kahn test was positive; cerebrospinal fluid 3 cells, protein 60; Kahn test positive, and colloidal gold 3333221100.

Result.—No appearance of atrophy in the sound eye; improvement in the affected eye.

CASE 2

Syphilis, acquired, late, central nervous system, vascular; optic atrophy. A female, age 51, was admitted in June, 1936, with a vague history of failure of vision for the previous six months. Visual acuity, R. 20/40, L. 20/40; both fields were definitely constricted by more than half their normal size with a 2 mm. white object. There was a dubious pallor of both discs. Blood Kahn test was positive; cerebrospinal fluid blood-tinged, Kahn test positive and colloidal gold 4443332200.

The treatment from October, 1936, to March, 1939, consisted of 27 injections of tryparsamide (78 grams); 22 injections of neoarsphenamine; 55 injections of bismuth metal; malaria in July, 1937 (7 chills). April, 1939.—Visual acuity, R. 20/25, L. 20/25; fields widened to three-quarters normal size; dubious pallor of discs the same. The blood Kahn test was doubtful; cerebrospinal fluid, 2 cells, protein 60; Kahn test positive and colloidal gold 5543322100.

Result.—Improvement in acuity and fields in both eyes.

CASE 3

Syphilis, acquired, late, central nervous system, tabes; optic atrophy (unilateral). A male, age 47, was admitted in March, 1936, with a history of failing vision in the left eye for the previous six months. Visual acuity, R. 20/20, L. 20/200; right field normal, left field grossly constricted; right disc normal, left disc showed the pallor of primary optic atrophy. The blood Kahn test was doubtful; cerebrospinal fluid, 2 cells (lymphocytes), protein 45; Kahn test positive and colloidal gold 1333322100.

The treatment from November, 1936, to March, 1939, consisted of 38 injections of neoarsphenamine, 26 injections of tryparsamide (51 grams), 61 injections of bismuth; malaria in June, 1937 (6 chills). January, 1939.—Visual acuity, R. 20/20, L. 20/200. Blood Kahn doubtful; cerebrospinal fluid, May, 1938, 6 cells (lymphocytes), protein 40; Kahn test positive, and colloidal gold 3322221111. Cerebrospinal fluid, January, 1939, 3 cells, protein 50; Kahn test positive and colloidal gold 2222110000.

Result.—No appearance of atrophy in sound eye; no change in the affected eye.

CASE 4

Syphilis, acquired, late, central nervous system, tabes; optic atrophy. A male, age 56, was admitted in October, 1936, with a history of failure of vision in both eyes for the previous three years. Visual acuity, R. 20/200, L. 20/200; gross constriction of both fields; both fundi were typical of primary optic atrophy. The blood Kahn test was negative.

The treatment from October, 1936, to March, 1939, consisted of 29 injections of neoarsphenamine, 27 injections of tryparsamide (78 grams), 64 injections of bismuth; malaria in November, 1937 (8 chills). March, 1939.—Visual acuity, R. 20/100, L. 20/100. The fields were still constricted but improved by about 25 per cent. The blood Kahn test was doubtful; cerebrospinal fluid, 4 cells (lymphocytes), protein 30; Kahn negative and colloidal gold 1100000000.

Results.—Improvement in visual acuity and fields.

CASE 5

Syphilis, acquired, late, central nervous system, meningovascular; optic atrophy. A male, age 53, was admitted in September, 1935, and the only note on his history was "some failure of vision for several months". November, 1937, visual acuity, R. 20/100, L. 20/100; right field grossly constricted to white and red objects, left field mildly constricted; fundi paler than normal, but not typical of optic atrophy. The blood Kahn test was positive. September, 1935, cerebrospinal fluid, 12 cells (lymphocytes), globulin increased; Kahn four plus and colloidal gold 5554420001.

The treatment from September, 1935, to March, 1939, consisted of 11 injections of neoarsphenamine, 40 injections of tryparsamide (106 grams), 82 injections of bismuth; malaria in September, 1935 (13 chills). March, 1939.—Visual acuity, R. 20/40, L. 20/20; constriction of peripheral fields the same. The blood Kahn test was negative; cerebrospinal fluid, January, 1937, negative for cells, protein 40. The Kahn test was three plus, and colloidal gold 2222220000. Cerebrospinal fluid, October, 1938, negative for cells, protein 45, Kahn test positive and colloidal gold 2222220000.

Result.—Improvement of visual acuity of both eyes; fields unchanged.

CASE 6

Syphilis, acquired, late, central nervous system; tabes; optic atrophy. A male, age 54, was admitted in April, 1937, with a history of failing vision in the right eye for six months. He had lost the vision in the left eye 30 years ago. Visual acuity, R. 20/70 with some constriction of the peripheral fields; the right fundus was normal, the left fundus showed an old chorioretinitis. The blood Kahn test was positive; cerebrospinal fluid, 93 cells, 96 per cent lymphocytes, 4 per cent polymorphonuclears, protein 50; Kahn test positive and colloidal gold 0112211100.

Treatment from April, 1937, to April, 1939, consisted of 21 injections of neoarsphenamine, 24 injections of tryparsamide (69 grams), 42 injections of bismuth; malaria in October, 1937 (6 chills). March, 1939.—Visual acuity, R. 20/70; fields the same. The blood Kahn test was positive; cerebrospinal fluid, 2 lymphocytes, 1 polymorphonuclear, protein 40, Kahn test negative, and colloidal gold 3222210000.

Result.—No progression of the optic atrophy in two years but no improvement.

CASE 7

Syphilis, acquired, late, central nervous system, tabes; optic atrophy. A male, age 62, was admitted in January, 1937, with a history of failing vision in the left eye for the previous six months. Vision in the right eye was lost due to an accident 32 years ago. Visual acuity, L., he could count fingers at three feet in a markedly restricted field. Left disc definitely paler than normal but otherwise negative. The blood Kahn test was doubtful; cerebrospinal fluid, 14 lymphocytes, protein 60, Kahn positive, and colloidal gold 5543322221.

The treatment, January, 1937, to November, 1938, consisted of 20 injections of tryparsamide (44 grams), 15 injections of bismuth; malaria in October, 1937 (9 chills). November, 1938.—Visual acuity, L. 20/100; field of vision slightly widened. The blood Kahn test was negative; cerebrospinal fluid, 1 lymphocyte, protein 40, Kahn test positive, and colloidal gold 4432211100.

Result.—Marked improvement in acuity of vision over a period of two years. The patient was discharged to his private physician and no follow-up notes have been received as yet.

CASE 8

Syphilis, acquired, late, central nervous system, tabes; optic atrophy. A female, age 48, was admitted in June, 1937, with a history of failing vision in both eyes for six months, which had become rapidly and progressively worse during the last month. Visual acuity, R. fingers at six inches, L., the same; discs showed definite changes of advanced optic atrophy. The blood Kahn test was doubtful; cerebrospinal fluid, 174 cells, 98 per cent lymphocytes, 2 per cent polymorphonuclears, protein 110, a positive Kahn test, and colloidal gold 34433.

The treatment from June, 1937, to April, 1939, consisted of 3 injections of neoarsphenamine, 25 injections of tryparsamide (50 grams), 40 injections of bismuth. After the fourth injection of tryparsamide the woman complained of seeing lights and flashes in front of her eyes and a definite diminution of vision in the right eye. Tryparsamide was discontinued for two months and started again. Malaria was induced in July, 1937 (7 chills). Vision slowly and steadily became worse. In August, 1938, she could only distinguish light, and in October, 1938, was blind. The blood Kahn test was doubtful.

Result.—Practically blind on admission, marked teichopsia after the fourth injection of tryparsamide, but subsequent resumption of therapy without ill effect; steady and progressive course to complete blindness.

CASE 9

Syphilis, acquired, late, central nervous system, tabo-paresis; optic atrophy. A male, age 62, was admitted in November, 1937, with symptoms of neurosyphilis, but having no idea that his vision had failed recently. Visual acuity, R. 20/30, L. 20/50; right fundus showed suspicious, but indefinite, pallor, left fundus oculi normal; the fields were full to red. The blood Kahn test was positive; cerebrospinal fluid, 78 cells, 90 per cent lymphocytes, 10 per cent polymorphonuclears, Kahn test positive and colloidal gold 4443222100.

The treatment from November, 1937, to April, 1939, consisted of 10 injections of neoarsphenamine, 17 injections of tryparsamide (45 grams), 29 injections of bismuth; malaria in April, 1938 (6 chills). April, 1939. —Visual acuity, R. 20/20, L. 20/50; fields of vision full to white and colour. The blood Kahn test was positive; cerebrospinal fluid, 2 lymphocytes, protein 35, Kahn test positive, and colloidal gold 3322100000.

Result.—Improvement in visual acuity in one eye; no change in the other.

CASE 10

Syphilis, acquired, late, central nervous system, tabes; optic atrophy. A male, age 54, was admitted in September, 1935. He did not know when his vision began to fail. Visual acuity, R. 20/100, L. 20/200; the right fundus showed small coloboma of the optic disc with some surrounding retinal degeneration; left fundus within normal limits; fields of vision grossly constricted. The blood Kahn test was negative; cerebrospinal fluid negative for cells, protein slight increase, Kahn test positive, and colloidal gold 1122321000.

The treatment from October, 1936, to March, 1939, consisted of 28 injections of neoarsphenamine, 25 injections of tryparsamide, (72 grams), 56 injections of bismuth. March, 1939.—Visual acuity R. 20/30, L. 20/30; constriction of fields had improved very little. The blood Kahn test was doubtful; cerebrospinal fluid, 3 lymphocytes, 1 polymorphonuclear, protein 35, Kahn test negative, and colloidal gold 1100000000.

Result.—Marked improvement in visual acuity in both eyes; very little improvement in constriction of fields.

CASE 11

Syphilis, acquired, late, central nervous system, tabes; optic atrophy. A male, age 64, was admitted in April, 1937, with a history of failing vision for the previous two years. Visual acuity, R. 20/50, L. 20/50 with correction; both discs appeared paler than normal, and there was slight but definite constriction of his peripheral fields, both to white and colour. The blood Kahn test was positive; cerebrospinal fluid, 5 lymphocytes, protein 70, Kahn test positive, and colloidal gold 4322211000.

The treatment from April, 1937, to April, 1939, consisted of 13 injections of neoarsphenamine, 14 injections of tryparsamide (30 grams), 58 injections of bismuth. April, 1939.—Visual acuity R. 20/20, L. 20/30, and the slight peripheral constriction in the fields remains the same. The blood Kahn test was positive.

Result.—Definite improvement in visual acuity over a period of two years, even with a small amount of tryparsamide (30 grams).

CASE 12

Syphilis, acquired, late, central nervous system, tabes; optic atrophy. A male, age 40, as admitted in June, 1938, with a history of failing vision for three months. Visual acuity, R. 10/200, L. 8/200; marked pallor of both discs, typical primary optic atrophy; gross constriction of peripheral fields. The blood Kahn test was positive; cerebrospinal fluid, 11 lymphocytes, protein 60; Kahn test positive and colloidal gold 3332221100.

The treatment from June, 1938, to April, 1939, consisted of 18 injections of neoarsphenamine, 10 injections of tryparsamide (27 grams), 21 injections of bismuth; malaria in September, 1938, (9 chills). April, 1939. Visual acuity, R. 20/140, L. 20/140; discs the same, peripheral fields the same. Blood Kahn test positive.

Result.—Definite improvement of visual acuity in both eyes following malaria and 27 grams of tryparsamide.

CASE 13

Syphilis, acquired, late, central nervous system, tabes; optic atrophy. A male, age 43, was admitted in July, 1937, with a history of failing vision for five years. Visual acuity light only in both eyes, very faint in right; discs showed pallor of primary optic atrophy; peripheral fields extremely narrowed. Blood Kahn test positive; cerebrospinal fluid, no cells, protein 50; Kahn positive and colloidal gold 422211000.

The treatment from August, 1937, to April, 1939, consisted of 32 injections of tryparsamide (88 grams), 36 injections of bismuth. April, 1939.—Visual acuity: he could see light quite well in the left eye, very faintly in the right eye. He thought his vision was slightly better; certainly it was no worse. Blood Kahn test positive; cerebrospinal fluid, 5 lymphocytes, protein 30; Kahn test positive and colloidal gold 2222211000.

Result.—Over a period of two years no change was noted in an advanced and previously progressive optic atrophy.

CASE 14

Syphilis, acquired, late, central nervous system, meningovascular; optic atrophy. A female, age 53, was admitted in July, 1937, with a history of rapidly failing vision for three weeks. Visual acuity, R. 20/20, L. 20/20, but objects blurred even at 20/70, 20/70, and there was definite peripheral constriction of both fields to white and more marked to red objects; both fundi were within normal limits. The blood Kahn test was positive; cerebrospinal fluid, 70 cells, protein 90; Kahn test positive and colloidal gold 555442211.

The treatment from August, 1937, to October, 1937, consisted of 4 injections of mapharsen, 7 injections of

tryparsamide (17 grams), 4 injections of bismuth; malaria in August, 1937, (9 chills). After the seventh injection of tryparsamide she had flashes of light, and increased foggy vision so that her visual acuity was 10/200 in each eye and the fields were narrowed down to pin-head size. Typarsamide was stopped and has not been started again. April, 1939.—Visual acuity, R. fingers only, L. fingers only; fields still narrowed to pin-head size; both discs showed primary optic atrophy in an advanced degree. The blood Kahn test was positive; cerebrospinal fluid, no cells, protein 40; Kahn test doubtful, and colloidal gold 2222111000.

Result.—Sudden acceleration of primary optic atrophy after the seventh injection of tryparsamide, resulting in almost complete and permanent blindness.

CASE 15

Syphilis, acquired, late, central nervous system, tabes; optic atrophy. A male, age 46, was admitted in April, 1937, with a history of failing vision in both eyes for the previous three years. Visual acuity, R. distinguished light at four feet, L. could see light at three feet; both discs showed the pallor of primary optic atrophy. The blood Kahn test was positive; cerebrospinal fluid, 15 cells, protein 70; Kahn four plus and colloidal gold 5555543300.

The treatment from April, 1937, to March, 1939, consisted of 20 injections of neoarsphenamine, 40 injections of tryparsamide (117 grams), 42 injections of bismuth; malaria in April, 1938 (7 chills). March, 1939.—Visual acuity R. blind, L. distinguished light at eight feet. The blood Kahn test was positive; cerebrospinal fluid, 2 lymphocytes, protein 35; Kahn test negative and colloidal gold 0011100000.

Result.—Though practically blind at beginning of treatment only one eye has progressed in blindness; vision in the other eye has improved.

The visual disturbances due to tryparsamide usually occur with the first six injections, are usually transitory, and are not accompanied by any objective loss of vision.

There has been a great deal of speculation about the manner in which tryparsamide affects the optic nerves, whether by a direct toxic action, or by an activation of a latent syphilitic process in the nerve. Leinfelder[6] found an acute degeneration of the cells of the innermost portion of the inner nuclear layer of the retina but no evidence of acute primary degeneration in the optic nerves and tracts. Wagener[5] suggests that the visual disturbances "may be of two different types, a transitory or mildly progressive reduction of vision which may represent the activation of a pre-existing lesion in the nerves, and a rather abrupt serious loss of vision without much tendency to recovery, which may represent a direct toxic action on the nerves in a patient with an idiosyncrasy to the drug." These two types of reaction do occur, but I think it is chiefly a matter of degree of sensitivity to the drug rather than two entirely different processes.

It is not my purpose to argue that tryparsamide cures optic atrophy, but rather to suggest that in certain selected cases it is not contraindicated. The optic atrophy will progress inevitably to blindness in all cases unless treatment is given, so one is justified in using any treatment that may stay its course. Also, the syphilitic infection of the rest of the nervous system must not be ignored, and these patients are improved generally by treatment with tryparsamide.

SUMMARY AND CONCLUSION

Fifteen cases of primary optic atrophy due to syphilis are reported, all of which were treated with tryparsamide. In 2 cases the drug was probably harmful, while in 5 the visual failure has been arrested for periods varying from six months to two years, and in 9 cases there has been improvement in visual acuity. As this period of observation is too short, and as most of these patients had had malarial treatment, it cannot be stated that tryparsamide produced all the good effects. It appears, however, that tryparsamide is not contraindicated in the optic atrophy of syphilis.

REFERENCES

1. CADY, L. C. AND ALVIS, B. Y.: *J. Am. M. Ass.*, 1926, 86: 184.
2. LEES, D.: *Trans. Ophth. Soc. United Kingdom*, 1932, 52: 203.
3. MAYER, L. L. AND SMITH, R. D.: *Illinois Med. J.*, 1934, 65: 258.
4. MAYER, L. L.: *J. Am. M. Ass.*, 1937, 109: 1793.
5. WAGENER, H. P.: *Am. J. M. Sc.*, 1937, 193: 286.
6. LEINFELDER, P. J.: *J. Am. M. Ass.*, 1938, 111: 1276.
7. WOODS, A. C. AND MOORE, J. E.: *J. Am. M. Ass.*, 1924, 82: 2105.

Clearer than optical glass, polymethyl methacrylate weighs half as much. As it is not easily shattered one of its first optical uses is in safety goggles. Ordinary eyeglasses, especially for playful children, can be made from this novel material, which can be ground and polished like glass. Standard shaped lenses can be moulded to exact size without costly finishing. A related use is for making the reflectors that line and mark the edge of highways. The acrylic resins do some jobs that glass cannot do. They have the happy property of total internal reflection, unpossessed by ordinary glass, one of the features of fused quartz that makes it valuable. This means that it can be used to "pipe" light, pouring it around corners of a rod of the resin. It has made possible new surgical accessories useful in medical practice and dentistry, rods that deliver light to inconvenient places in the mouth and other human anatomical locations. It allows the production of novel effects in illuminated display signs.—*Science News Letter*, Aug. 12, 1939, p. 106.

Case Reports

A FATAL CASE OF AGRANULOCYTOSIS FOLLOWING THE USE OF SULFANILAMIDE

BY J. P. ROBB

Montreal

The following case demonstrates the necessity for careful supervision of all patients being treated with sulfanilamide, as well as the danger of selling it over the counter without a prescription.

T.P., a Chinese male, aged 29, was admitted to the Montreal General Hospital on September 14, 1939. Some weeks previous to his admission he developed an acute urethral discharge, supposedly gonococcal in origin. About August 25th, he went to the corner drug store and bought some pills for the treatment of discharge and burning micturition. He took two of them three times a day, as directed by the druggist. This story was obtained by a Chinese medical student, and as far as we could determine was accurate. We went to the drug store where he obtained these pills and found that they were five-grain tablets of sulfanilamide. He had bought nine dozen and took them all, making a total of 540 grains over a period of three weeks.

The patient had complained of headache, general malaise, and chills at night for about two weeks, but was brought to the hospital because he had fainted that morning in the restaurant in which he worked.

The temperature on admission was 105.2°; the pulse 88; and the respirations 20. He was a thin man in no distress, not appearing to be as ill as one would expect for that temperature. There was a slight cyanosis, but not more than one would expect in one of his race. The physical examination revealed very few positive findings. The tongue was dry and coated. The teeth were in a poor state of repair. Small shotty glands were palpable in the anterior cervical and inguinal regions. The chest was normal. The blood pressure was 112/60 and the heart was not enlarged. A soft systolic murmur was heard at the mitral area which was transmitted towards the base. The findings in the abdomen and nervous system were within normal limits.

On the day following admission, the patient for the first time complained of a sore throat, which got progressively worse. Throughout his six days on the ward the temperature ranged between 103 and 106°, most of the time being about 105°. He slowly became irrational, and required sedatives to control him. On September 19th, he became cyanotic, the pulse increased to 160, and the respirations became shallow. There was dullness at the right base, with a nasal pitch to the breath sounds, suggesting a terminal bronchopneumonia.

On admission, September 14th, he had 2,400 white blood cells, 3,520,000 red blood cells, 174,000 platelets, and hgb. of 59 per cent. Smears were examined on several occasions, but at no time were any granulocytes found. By September 16th, the white cells had fallen to a level somewhere between 500 and 200, and remained at this low level until the morning of his death when the count rose to 2,000. The urine was clear and the stools free of blood. On September 15th, the urea nitrogen was 14 mg. per 100 c.c.; creatinine 1.80; uric acid 3.38; van den Bergh 1.0 unit, and the blood sugar (fasting) 0.145 per cent. There was a faint trace of sulfanilamide in the blood, but no methæmoglobin or sulphæmoglobin. X-ray of the chest showed some increase in the bronchial and peribronchial markings, more marked on the right than on the left. The blood Wassermann and the Neisser complement fixation test were both negative. Blood culture on September 14th was negative.

He was treated with 120 c.c. of pentnucleotide spread over four days, liver extract daily, and three blood transfusions, none of which affected the ultimate outcome.

The final clinical diagnosis was acute agranulocytosis, precipitated by sulfanilamide, with terminal bronchopneumonia. The patient died on September 19th.

An autopsy was performed, and an extensive suppurative bronchopneumonia with multiple small abscess formation was found. Mononuclear cells predominated in the exudate. The prostate showed a diffuse infiltration into the stroma, and an exudate into some of the alveoli of small mononuclear cells. The striking feature of the bone marrow was that there were very few granular cells.

TURNIP JUICE FOR PEPTIC ULCER.—Sir,—In the paragraph on ascorbic acid and peptic ulcer (*Brit. M. J.*, January 6, p. 25) you mention (*a*) that the usual Sippy diet contains much less than the normal requirement of ascorbic acid (which I suppose to be synonymous with vitamin C or at any rate very close to it), and (*b*) that the juice of one or two fresh oranges will supply the deficiency. (Warren, Pijoan, and Emery, *New Engl. J. Med.*, 1939, **220:** 1061). For some years we have been using turnip juice or turnip juice and orange juice mixed for that purpose, because reason (*a*) was obvious. We did not know the fact further suggested by your note that patients with duodenal ulcer utilize 20 per cent more ascorbic acid than do normal people. If so, it is of great interest and throws a light on the rapid improvement we thought we noted in our patients. The turnip juice is made by cutting off the top of a turnip (the white globe are preferred for taste; but swedes will do, or yellow turnips), hollowing out the turnip, filling the hollow with brown sugar (Barbados muscovado for choice), and standing the thing upright. Next day the sugar has dissolved in the juice it has sucked from the flesh. The turnip will be fresher than oranges, which (*vide* Professor Plimmer) deteriorate in vitamin content when in cold store. Anyhow the mixture is found to be very acceptable and effective (*cf.* Miss Harriet Chick's experiences with turnip juice in the Infants' Hospital in Vienna in 1919).—I am, etc.—Lionel Jas. Picton, cor. in *Brit. M. J.*, 1940, **1:** 111.

Therapeutics and Pharmacology

NEEDLE FRAGMENTS IN THE FINGER

By S. Gold

Montreal

Physicians doing compensation work in large cities often meet with the type of accident popularly known as "needle in the finger". A few general remarks about this may be in place.

The electrically operated sewing machine used in the large modern clothing factory makes about 25 stitches per second. This rate of speed accounts for the highly polished surface one finds on the needle after it has been in use for a short time, as well as for the heat which it develops soon after it has been set in motion. The combination of these factors is probably responsible for the unusually low incidence of infection as well as the small amount of blood lost in this type of accident. The index and middle fingers of the left hand are most commonly involved, as these two fingers are the closest to the site of danger when the machine is in operation. Usually the needle penetrates the whole depth of the finger; rarely does one find the needle causing only a puncture wound. The latter case is brought about by the following circumstances. The operator, in order to make some preparatory adjustments, is slowly turning the balance-wheel with his right hand. Then it is that a stray finger of the left hand is often pierced by the slowly moving needle. Usually the right hand stops turning the balance-wheel, reflexly, as soon as the needle penetrates the finger of the left hand. Here, one seldom finds fragments of the needle in the wound, as the circumstances are not favourable for the splintering of the needle inside the wound.

What are the usual circumstances favouring the splintering of the needle within the finger? The needle in the electrically operated sewing machine is moving at the rate of 25 per second. It takes therefore one twenty-fifth of a second for the needle to go through the finger, a time much shorter than it takes for the finger to be withdrawn reflexly. As the needle goes through the finger the reflex of pulling the hand away is set in motion. The finger with the needle in it is pulled away, the needle is deviated from its course, and, instead of entering the opening in the foot and plate of the machine, its point now hits the side of the foot or the plate and splinters. If after the available fragments of the needle have been pieced together it is found that no fragments are missing the accident seldom if ever requires any more attention than the application of a disinfectant and a bandage. If, however, some parts of the needle are found missing, then it has to be proved that they are not embedded in the tissues of the finger. Here one usually finds the following. On the dorsal side of the finger, quite commonly through the nail, there is an opening marking the site of entrance of the needle. A spicule of nail is often found overlying the opening. Occasionally more than one opening is found on the site of exit of the needle, but rarely is there more than one entrance opening.

In dealing with this type of accident, I found the following method of treatment the most satisfactory. After establishing by x-ray the presence of needle fragments, their number and location, the skin is rendered surgically aseptic, and a 2 per cent novocaine solution is injected one-half inch distal to the wound. The edges of the entrance opening are trimmed if necessary, or if there is a spicule of nail covering the opening it is cut away. A darning needle with an eye opening large enough to hold the usual needle fragment is used. (Roughly corresponding to the Mayo's intestinal straight needle, size 1). It is preferable to use one in which only the distal end of the eye is grooved. The needle is sterilized. Holding the needle between the index and the thumb, the distal end (the end where the eye of the needle is) of the needle is gently introduced into the entrance opening of the wound and allowed to find its way along the tunnel by rolling it and pushing it forward at the same time in the corkscrew manner. This corkscrew movement is an important factor in the successful removal of the fragments. It is this rotary movement of the eye of the needle that picks up the fragment, it is the forward movement that eventually brings it to the outside, and it is the uniform pressure of the walls of the tunnel on both sides of the eye of the needle that is greatly responsible for the fragment not being dislodged from it. (The rotary movement as well as the impaction of the fragment in the eye of the needle which one often finds are other factors which play a part in retaining the fragment in the eye of the needle). When the eye of the needle comes in full view outside the exit opening, one usually finds the fragment lodged there. This is now removed under aseptic conditions, and the needle is now drawn towards the entrance opening with a similar rolling movement, without its being withdrawn, however. This process is repeated until all fragments are recovered. The needle is then removed in the same way as it was introduced.

A similar technique may be used in the needle puncture wound where a fragment of the needle is lodged. This combination of findings is a rare occurrence, as circumstances which are not very common are necessary to bring this about.

These circumstances are the following. A needle which is slightly bent strikes the bone, and breaks before going through the whole thickness of the finger. Here, the difference in technique is the complete withdrawal of the needle after each operation, for self-evident reasons.

Using this method I find that the patient is able to resume work on the day after the removal of the foreign body, and rarely requires more than two medical visits. It is preferable to remove the foreign body within forty-eight hours.

Other methods of dealing with this type of accident may be mentioned here, mainly for their inadequacy. The cutting down on the foreign body usually results in a relatively extensive scar which in the case of the finger tips very often results in a permanent diminution in the tactile sense there. The loss of time is also to be considered. The practice of leaving the fragment alone, to wait for suppuration or organization to take place is not commendable. The pain, loss of time, the possibility of the infection extending, as well as the likelihood of a puckered scar which are common with suppuration, are objections to be considered. Then again, if organization takes place, a nodule made up of fibrous connective tissue forms, which often causes quite a bit of discomfort to the patient; especially is this the case when pressure is put on it. (In the latter case the physician is never certain when to discharge the patient as the latter may continue indefinitely to complain about pain at the site of injury.)

The electric probe magnet, besides its being out of working order quite frequently meets with failure too often, especially when the needle fragment is too deeply embedded in the finger.

Clinical and Laboratory Notes

Sulfanilamide as a Preservative for Stored Blood

Another use for sulfanilamide is pointed out by Dr. Milan Novak, who states that by adding a small amount of it to stored blood bacterial contamination of the latter may be prevented.

With the increasing importance of blood transfusion in recent years and the advent of blood banks or stored reserves, Dr. Novak points out, a solution to the problem of contamination is vital. He states that estimates have been made of contamination in stored blood running as high as 50 per cent. Blood is an excellent vehicle for bacterial growth; some organisms live and multiply in blood stored at temperatures as low as 39.2 to 42.8° F.

"The detection of contamination in stored blood is an uncertain procedure, since the number of organisms is usually small". He found that by the addition of 20 mg. of sulfanilamide per 100 c.c. of blood the latter would not only not support bacterial growth for ten to fifteen days but might actually become sterile in that time. He also found that about 5 per cent of blood which had been stored for ten days was grossly contaminated.

Because the control of bacterial growth is uncertain, even with sulfanilamide added, in blood stored for longer periods it does not seem advisable to store blood for more than ten or fifteen days.

Dr. Novak points out that contamination is most likely to occur when the blood is drawn from the donor. "Assuming that all glassware, instruments and solutions used are sterile, there still remain several sources from which the blood can become contaminated. Complete sterilization of the skin previous to opening the vein is impossible, since there are always a few bacteria which escape the bacteria-killing action of any skin antiseptic."

Dr. Novak suggests that sulfanilamide may prove valuable as a preservative in other biological substances also.—M. Novak, *J. Am. M. Ass.*, 1939, **113**: 2227.

First it behoveth him that will profit in the craft of surgery that he set God before him in all his works and evermore call meekly with heart and mouth His help; and occasionally give of his earnings to poor men, so far as he may, that they by their prayers may get him grace of the Holy Ghost. And that he may not be found hesitating or boastful in his words or in his acts let him refrain from talking too much, especially amongst great men, and let him answer advisedly questions which are asked him lest he be caught out afterwards in what he has said. Forsooth, if his deeds be known often to disagree with his words and his behests he will harm to his own good fame. Wherefore a poet says "Let your work be better than your words, as boasting is hurtful".—Master John of Arderne.

Tetrabromofluorescein, a dye contained in some lipsticks, may cause skin eruptions and other troubles. The changes noted are dry, fissured and cracked lips, itching eyelids and scaling and redness about the face, eyelids and behind the ears. Stomach upsets were also caused by this dye. "We know of no reported case of such an eruption due to this dye. The abdominal complaints were especially interesting and may be of importance in explaining other obscure cases of vague abdominal symptoms frequently complained of by women."—R. Hecht, B. Z. Rappaport and L. Bloch, in *J. Am. M. Ass.*, 1939, **113**: 2410.

Editorials

SOME PRINCIPLES UNDERLYING THE TREATMENT OF HEADACHE

HEADACHE is the commonest of all symptoms. It has antisocial implications In addition to the sufferings of the unfortunate patient himself we should remember the interference with his business affairs, his duties and recreations, and the disturbance of his relations with his associates, friends, and relatives. We must admit, therefore, that headache is a subject of great importance. Its investigation will often tax the resources of the clinician to the uttermost, for it will often lead him into the mazes of medicine, surgery, and the specialties. Even then the solution of the problem may evade him. The milder headaches are usually dealt with by the sufferer himself, who takes a laxative, a stomachic, a sedative, or one of the many analgesics obtainable at the country grocery or the departmental store, but any headache that is severe enough or frequent enough to bring him to the doctor should be dealt with by the latter in no cursory manner; it demands the most searching investigation.

Within the limited space here available it is manifestly impossible to exhaust the subject of the treatment of headache. At best only general principles can be laid down. Here, as elsewhere, successful treatment is dependent on accurate diagnosis. Unless we are content to be mere empirics we must exhaust all the methods of examination available to us. In the case of headache diagnosis is particularly difficult; there are so many causes, operating singly or together. It will be of some help to know what are the most frequent causes of headache. Sir Edmund Spriggs[1] gives a summary, as follows, of an analysis of 7,100 consecutive cases made by Dr. Mary Watson and Mr. A. J. Leigh.

"One-third of the whole, namely, 2,365 cases, were the subjects of disease of the heart, arteries, and veins. One-third suffered from diseases of the throat, œsophagus, stomach and duodenum. With diseases of the pancreas, liver, gall bladder, appendix, colon and rectum added, just over a half were admitted for complaints of the alimentary canal and its accessory viscera. Other large groups were in the following order: arthritis and rheumatic diseases 670 cases; nervous diseases 558 cases; next in order of numbers, affections of the lungs, diabetes, over- or under-nutrition; affections of the ductless glands, kidneys, blood, skin, excess of alcohol, tobacco and other drugs, affections of the throat and nose, prostate, womb and ovaries, bladder, and eyes. Then comes a long list of diseases of all kinds, of which there were less than 71 cases, that is, less than 1 per cent of each." An appalling list! but serviceable, as it makes us cognizant of the magnitude of the problem.

A classification of the causes of pain in the head which is useful for diagnostic purposes is that given by Dr. Henry Cohen.[2] It is as follows:

1. *Intracranial*—namely, diseases of the brain and meninges.
2. *Cranial*—namely, diseases of the skull bones and the enclosed air sinuses.
3. *Extracranial*—namely, diseases of the scalp. For example, fibromyositis of the occipitofrontalis muscle or its aponeurosis; trigeminal, sphenopalatine (Sluder's), and occipital neuralgias; herpes supraorbitalis; temporal arteritis etc.
4. *Reflex*, from diseases of the eyes, teeth, and nose, though nasal causes might produce their effect through the air sinuses—for example, by inflammatory changes spreading to them or the production of the so-called "vacuum" headache.
5. *Toxic*, the source being (*a*) exogenous—for example, alcohol, tobacco, lead, poisonous fumes, CO_2, etc.; or, (*b*) endogenous—for example, uræmia, constipation, fevers.
6. *Migraine*, an incomplete diagnosis signifying a syndrome—that is, a constantly recurring group of symptoms which is the clinical expression of a disturbed mechanism common to many pathological states. It merits a separate category because the syndrome itself is significant even when the exciting cause remains unmasked (*cf.* epilepsy).
7. *Psychogenic*, occurring in psychoneuroses, psychoses, and exhaustion states.

1. SPRIGGS, SIR E.: A clinical study of headaches, *The Lancet*, 1935, **2**: I, 63.

2. COHEN, H.: Intracranial causes of headache, *Brit. M. J.*, 1939, **2**: 713.

It must not be concluded, however, that the etiology of headaches is as clean-cut as all this. The groups overlap, that is, in some cases more than one cause may be at work. Some of these may be removable, others not. Fortunately, the removal of only one of the causes will sometimes give a measure of relief.

The object of the medical man, of course, is to cure; if this is impossible, to palliate. Our first endeavour, then, should be at the outset to establish the direct and indirect causes. It is well to remember that there are few sufferers from headache who are not obviously in poor health otherwise and in whom more than one immediate or remote cause are not operating. The cranial and extra-cranial forms of headache will not be considered here. Their causes are usually obvious and can be dealt with along presently accepted lines. Our remarks will be confined to the intracranial varieties.

In our examination we should endeavour first to determine in how far the given headache is basically hereditary, psychogenic, organic, or mixed.

In as much as headache is only a symptom we are dependent largely on the patient's statements and his ability to describe accurately his sensations. His powers in this direction will always have to be assessed. A carefully taken and correctly given history is, then, the first essential. We should learn the site and duration of the headache, its character, its mode of onset and decline, whether it is constant, intermittent, or characterized by paroxysmal exacerbations; the circumstances that excite it, aggravate it or ameliorate it; its intensity (here the patient's threshold for pain is of importance). This enquiry alone may give us the diagnosis, or, if not, may indicate the direction that further investigation should take.

When any abnormal state of the body, whether, mental or physical, is detected our endeavour should be directed to cure or modify this. The treatment will, therefore, be medical or surgical as the case may require and will depend on the diagnosis made. Further, each case should be an individual problem.

In the case of habitual headaches of indeterminate origin, and especially in migraine, where no removable cause can be found the patient should be taught "how to live". A quiet mode of living should be advised—rest, physical and mental, sleep, gentle exercise, sensible and proper food, and avoidance of alcohol. An hour's rest on a couch, with sleep, if possible, after lunch, will increase the power to work and lessen strain. "The itch to be doing something all the time is a fosterer of headaches" (Spriggs). This advice is also helpful in the hereditary and psychogenic types. If anæmia be present it should be corrected. Constipation, if present, should be relieved by safe and appropriate measures.

Persistent *i.e.* continuous headaches were found by Spriggs in only 45 (9 per cent) of his 500 cases. They were found to be, in order of frequency, organic intracranial, vascular, nephritic, psychasthenic, and mental. Intense headaches, in which headache is the only or predominant complaint occurred in 85 cases (17 per cent). They were in order; migraine, 36; hyperpiesia, 8; nephritis, 6; sinusitis, 6; ocular, 5; rheumatic, 4; nervous exhaustion, 4; constipation, 3; and smaller numbers in other groups.

Migraine is therefore the most frequent and intractable of the severe headaches. Its treatment will tax the resources of the medical man to the uttermost. The causes are innumerable and a successful or partially successful result can only be expected if in a particular case the cause can be detected and removed. Here diet, an allergic state, sinusitis, eye-strain, merit particular investigation. So many drugs have been recommended for the attack that one is tempted to doubt the efficacy of any of them. Readers are recommended to read the very excellent summary of the treatment of migraine given by Sir Edmund Spriggs (*loc. cit.*, p. 66).

That the treatment of headache is worth while is shown by the statistics given by Sir Edmund, who in cases followed up for a reasonable time found that the patients were practically cured or greatly improved in 77.6 per cent of cases. He concludes his lecture with these statements:—"In reviewing ancient and modern methods of treatment, some valuable weapons have of late been added to our armoury. None is suitable for all cases and there are no miracles." A.G.N.

THE HUMAN FOOT DIVINE

WE remember reading some time ago in an article devoted to some art topic a statement to the effect that the foot is the most beautiful part of the human body and therefore merits the attention of the artist more than the hand or even the face. It is arguable that the foot of an infant is a beautiful object, but what can we say about the foot of the average human adult? Rather do callouses, corns, bunions, hammertoes, deformities, and even anchyloses, combine to make the foot one of the most melancholy objects in nature. The sad part about it is that, except in the case of inherited defects, the most of these conditions are preventable but not prevented. The foot is intended for locomotion. It is strong, flexible and resilient and is marvellously adapted for its purpose, but ignorance, carelessness and fashion have combined to lessen its effectiveness. There is another aspect to this matter also. Painful feet limit activity, interfere with correct posture, and cause irritability and bad temper. In the past we have been content to suffer, going to the chiropodist or surgeon only when the disability has become unbearable. Now, however, industrial concerns are beginning to look into the bearing of painful feet upon business efficiency, and physicians are taking more interest in the etiology and the measures for relief. The subject is of widespread interest and importance, and is now, at long last, being scientifically studied.

According to Dr. Margaret Elmslie[1] the infant just walking appears to develop substantially the same type of deformity as is found in the adult, though without pain. She finds that in 80 per cent of children aged from two to four years there is a deflection of the terminal phalanx of the hallux, and in not a few it diverges from its fellows. She thinks that in all cases and at all times the use of shoes should be avoided in children whenever possible, in order to maintain the natural freedom of the foot and to avoid the traumata which ill-fitting shoes can so easily produce and convert into visible deformities. When shoes are worn they should be chosen on a rational basis. The shoes should be sufficiently long and wide so as not to crowd the toes. It should be remembered that in children the great toe is sometimes one-half an inch longer than its fellows. The toes should not be compressed laterally. Round-toed shoes are not desirable. They tend immediately to cause the great toe to be incurved instead of remaining straight and in its natural axis, and the metatarso-phalangeal and interphalangeal joints are involved as well. If the shoe is short as well as round-toed flexion of the great toe sometimes follows. Proper shoes, well fitted, will prevent trouble later. In fact it would appear that the principles which govern the designing of a proper shoe for children should be applied in the case of adults. But the matter is complicated by the fact that in the latter the shoe has to be adapted to a greater variety of purposes calling for the use of a number of differing materials. And there is also the compelling influence of fashion which guides so much of our action. Even so, the ideal should not be beyond each.

Mr. W. S. Creer[2] has given us his opinion as to what should characterize the ideal shoe. (1) It must grip the heel firmly; (2) there must be a bar or other tie which fits over and grips the instep; (3) the fore part must conform to the foot and must allow room for the toes to move; and (4) the heel, if the shoe is to be worn out-of-doors or at work or play, must not be higher than 1 to 1½ inches. "So simple but so difficult to obtain."

Dr. James Mennell,[3] in his presidential address before the Section of Physical Medicine of the Royal Society of Medicine, delivered on November 17, 1939, advanced some pertinent considerations. The general contour of any shoe, to be accurate, should be roughly triangular as seen from above, the heel being somewhat rounded. "The variation in shape in ordinary commercial shoes can easily be tested by placing a straight line from the centre of the heel to

1. ELMSLIE, M.: The prevention of foot deformities in children, *The Lancet*, 1939, **2**: 1260.

2. CREER, W. S.: Common foot ailments, *Brit. M. J.*, 1938, **2**: 5.

3. MENNELL, J.: President's address, *Proc. Roy. Soc. Med.*, 1939, **33**: 105.

the toe of the shoe, running along the middle of the waist. In the normal foot this line usually passes through the space between the second and the middle toes, but in many shoes the design is such that this line passes much too obliquely on the one side or the other, which means that there must be a forcible strain on the joints of the forepart of the foot, tending to swing it away from the side which has the pressure." It is important in fitting shoes to remember that on standing or walking the foot spreads and, so, it is necessary to allow one to one and a half shoe "sizes", and perhaps even an additional half size for the sock, over and above what is indicated in the sitting position. Dr. Mennell held that what happened to the front of the shoe was a matter of indifference, provided that this essential space be safeguarded. It was immaterial to what degree the further pointing of the shoe took place—always provided that the inner side of the shoe did not begin to slope towards the point until the front of the big toe was reached. Shoemakers often sloped away too early, with the result that on one side there was compression of the hallux, while on the other there was no room for the little toe to slide forward.

High heels always provide matter for argument. Women tend to use high heels, men, low ones. As a general principle boots which are intended for street use or for athletics should be low. Dr. Mennell thinks that many men would be more comfortable with a 2¼ inch heel. A low heel may be most pernicious for a man, and many women cannot walk in comfort unless they use a half inch heel or none at all, particularly those with hallux rigidus. Further, with regard to the proper height of a heel, Dr. Mennell does not think that, except in the case of some extraordinary abnormality, a heel more than three inches high is ever required. The sufficiency of the tendo Achillis alone controls this problem and on this depends that of the flexor longus hallucis. In our opinion the breadth of a heel is as important as its height. You often see on the street women wearing high "pin-point" heels. You note in these cases that much strain is put upon the ankles, which "wobble" dangerously, making gait uncertain, putting strain upon the ankle joint, and interfering with the poise of the body. Heels such as these to which we are referring may, perhaps, be permissible in a ball-room, but for general use are undesirable, contributing much towards causing fatigue. The heel is worthy of more particular study.

The "upper" varies greatly with style and manufacture. Some latitude may be permitted if certain considerations are kept in mind. Depth under the toe-cap and over the outside should be provided. It is necessary to prevent the foot from crowding forward. This can be done by appliances that will keep the heel back in the shoe. Straps, laces and other contrivances are of value here. Two straps, preferably buckled, are requisite; one strap is not enough. Sometimes the use of a pad of felt under the tongue of the shoe will be found effective. It is of good omen that women are beginning to ask for the larger sizes of shoes and no longer try to cramp their feet. No doubt this is in large part due to the popularity of athletics and out-door sports. It is all to the good.

All this, of course, points to an ideal, and may be termed preventive orthopædics. When lesions are present which result from ill-fitting footwear it may very well be that the sufferer will be unable to tolerate properly designed shoes. It is said that only 80 per cent of people can be fitted from stock, and then only if they accept the style the salesman offers them. The other 20 per cent must either have their shoes made to order or put up with misfits.

The subject is by no means exhausted, but we would commend to the attention of our readers an excellent article on "The Treatment of Painful Feet" by Dr. George W. Armstrong, of Ottawa, (see page 227 in this issue) which admirably supplements what has been said here.

Before much improvement of the situation can be expected we must have co-operation between doctors, patients, employers of labour, shoe designers, and manufacturers. This will, no doubt, take time for accomplishment, but the light is breaking.

A.G.N.

Editorial Comments

The Nomenclature of Blood Groups

At this point in our history an accepted nomenclature for blood grouping, always important, bulks large in our program. We desire to bring very specially to the notice of our readers, through the courtesy of Dr. R. E. Wodehouse, Deputy Minister of Pensions and National Health, Ottawa, a letter received by him from Dr. Neville M. Goodman, of the British Ministry of Health, London, which is pertinent to this subject.

Ministry of Health,
Whitehall, S.W.1.
January 9, 1940.

Dear Sir,

Nomenclature of Blood Groups

As the British member of the Health Committee of the League of Nations, I have been asked to draw your attention to the following resolution passed at the meeting of this Committee on November 20 to 25, 1939:

> "The Health Committee believes it to be its duty once more to draw the attention of all concerned to the recommendation adopted by the Permanent Commission on Biological Standardization in 1928 concerning the nomenclature to be adopted in the designation of blood groups. It is of opinion that, especially in present circumstances, the use of a uniform nomenclature will obviate mistakes which might entail serious consequences."

In 1928, the Permanent Commission on Biological Standardization reported that:

> "The Commission learns with satisfaction that, on the initiative of the Health Organization of the League of Nations, the nomenclature proposed by von Dungern and Hirszfeld for the classification of blood groups has been generally accepted, and recommends that this nomenclature shall be adopted for international use, as follows:
>
> O A B AB
>
> To facilitate the change from the nomenclature hitherto employed, the following is suggested:
>
> Jansky O(I) A(II) B(III) AB(IV)
> Moss O(IV) A(II) B(III) AB(I)
>
> The Commission recommends the adoption of the following method of designating test-sera.
>
> Test-serum A (anti-B),
> Test-serum B (anti-A).
>
> Test-serum A (anti-B) should be placed in containers of white glass, test-serum B (anti-A) in containers of brown glass.
>
> The Commission having learned that in certain countries this nomenclature was not yet in current use, emphasized the importance of achieving uniformity in the matter. The Commission believes that this object might be attained:
>
> (*a*) if each Institute which supplies standard sera used solely this nomenclature;
>
> (*b*) if the editors of scientific journals (medical, legal, etc.) insisted upon the exclusive use of this nomenclature in all the works they may be called upon to publish. It is particularly desirable that all the more important weekly medical journals should also conform to this rule."

The attention of the Health Committee had been drawn to the question by the Danish member, who stated that authoritative British medical journals had recently published articles in which the old nomenclature had been used.

Yours faithfully,
NEVILLE M. GOODMAN.

The statement that authoritative British medical journals have recently published articles in which the old nomenclature was used calls for serious consideration. While the recommendations of the Health Committee of the League of Nations have been widely accepted and acted upon it is certain that in Great Britain, and also, we may say, in Canada complete uniformity has not yet been attained. The call for blood transfusion is likely to be much greater in the near future, and it is obvious that errors due to confusion in nomenclature should be avoided. This can easily be the case if those doing the tests will only take the trouble to conform to the recommended technique. We would also urge that hospitals and private laboratories should standardize their methods and reports, not only for the exigencies of war but also in peace time.

We are glad to state that at a meeting on December 2, 1939, of the Sub-committee on Blood Storage (of which Prof. J. B. Collip, F.R.S., is the Chairman), of the Associate Committee on Medical Research of the National Research Council (Canada) it was decided that the international nomenclature with reference to blood groups should be adopted in the records of the Sub-committee and in correspondence relating to the Sub-committee's work.

It would be hard to overstate the importance of this subject, and we commend it to the attention of all those concerned with such work.

A.G.N.

Conduct thyself always with the same prudence as though thou wert observed by ten eyes and pointed at by ten fingers.—Confucius.

Although the operations of Nature are hidden, we must acknowledge the hand of a Power which acts in secret, as we acknowledge a force which attracts heavy bodies to the earth or which carries light bodies upwards.—Marcus Aurelius.

Whoever loves the golden mean avoids in safety the squalor of an old house, while in the enjoyment of moderation he escapes the unpopularity that dogs those who dwell in palaces.—Horace.

A benefit consists not in that which is done or given but in the spirit in which it is done or given; for it is the spirit in which a kindness is done that makes it valued.—Seneca.

Medical Economics

V.

THE DEVELOPMENT AND CHARACTERISTICS OF GOVERNMENTAL HEALTH INSURANCE PLANS IN EUROPE AND THE BRITISH EMPIRE

(EXCLUDING CANADA)

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In now presenting a brief review of the main features of the governmental plans of health insurance in Europe and the British Empire it may be observed immediately that practically all the methods to be considered are characterized by (i) a background of many years' experience with voluntary plans; (ii) a fairly strict adherence to the "insurance" principle (as that principle was explained in the preceding article); (iii) legislative compulsion and supervision by the Government concerned; (iv) a limited application, so that the plans cover only certain specified earning groups within each country; (v) a tripartite contribution basis, by employees, their employers, and the State; and (vi) the payment of cash benefits as well as benefits in kind. We shall not include, therefore, any examination of the "state medicine" of Russia—the only country where that method has been introduced—for, as already noted, it is a concept which discards wholly the co-operative insurance principle, and substitutes a totalitarian compulsion upon every group and class.

THE GERMAN PLAN OF HEALTH INSURANCE

The first national scheme of health insurance was inaugurated in Germany in 1883. In these belligerent days such a plan might seem to be unimportant as a precedent; it should, however, be realized that it was initiated in the days of Bismarck not merely as a measure calculated to improve the physical condition of the people and ameliorate some of their economic grievances, but also as a means of curbing the power of the Socialist movement through the establishment of a widespread bureaucratic organization controlling the wage-earners of the country. After some years, nevertheless, the Social Democrats discovered in the system a political asset which could be used to their own advantage, so that later they became supporters of the plan.

Covering at first only industrial workers, the scheme was afterwards extended to commercial, industrial, and agricultural pursuits under a stated income limit, and was based on the utilization of existing voluntary sickness funds ("krankenkassen") for the distribution of cash sickness, maternity, and funeral benefits, and benefits in kind—medical care, hospitalization, and specialist and dental benefits—for periods not exceeding 26 weeks, to insured persons and their families. The contributions were fixed by the various funds in relation to the employee's basic wage—two-thirds being paid by the employee and one-third by the employer (the State not contributing except as to one-half of the cost of maternity benefits for the uninsured wives of insured persons). The cash benefits were usually 50 per cent of the basic wage, although an additional 25 per cent might be granted by those funds which exhibited a satisfactory experience. The plan thus drew upon the lessons of the old guild funds, and careful precautions were included at the outset to maintain elasticity throughout the system.

Gradually, however, the various permissive regulations were abrogated in favour of stricter and mandatory rules. Eventually, the National Socialist revolution of 1933 caused a number of fundamental changes. The social insurance institutions, which had been weakened financially during the economic depression, were reconstructed; the doctors and dentists, whose position under the insurance societies had for many years been the subject of acrimonious debates, were brought under the supervision of the Minister of Labour, through whom they have since been subjected to strict regulations governing admission to insurance practice, fees, and discipline. A comprehensive Act of July 5, 1934, then introduced much greater administrative uniformity, with increased centralization; the contributions payable by the employee and employer were equalized; and the contracts with the doctors, which earlier had been a matter for negotiation between the doctor and his fund, were standardized by law.

Today, of course, the totalitarian economy of Germany renders any attempt at appraisal of the present status of the health insurance scheme both futile and unnecessary. Several conclusions, however, must be drawn from the history of its fifty years' development prior to 1933. Certainly one of the most important is that the establishment of such a plan for a political objective, but without at first securing a fair basis for the co-operation of the members of the medical profession who provide the most essential services required, must bring sharp controversy, and much bitter argument. The records of this fact in Germany are available for all to read and learn. Another feature of significance is the manner in which the emphasis was shifted gradually from the payment of cash benefits to the provision of benefits in kind. A third observation from the detailed statistics

of that long experience—confirming what is well known from British sources also—is the necessity for providing, under an insurance scheme, for rates of claim to sickness benefits which are based upon an actuarial analysis of the rules under which such claims arise—for a basic rate of sickness may remain unaltered, and yet the rates of claim for benefits obviously may undergo great changes as a result of alterations in the rules. Lastly, the complexity and costs of administering such a plan have been revealed as factors to be emphasized.

THE BRITISH NATIONAL HEALTH INSURANCE ACTS

The government-sponsored plan of compulsory health insurance which was introduced into Great Britain by Lloyd George in 1911 was again, in its early conception, a product of political considerations. Following in many respects the original German pattern, but with greatly simplified administration, it was at first opposed by many groups, and became the centre of great controversy. It employed devices which aimed, on one side, to tempt the worker with the promise of advantageous benefits. On the other hand, one of its avowed objectives was to provide support for, and obtain the administrative help of, the numerous existing "Friendly Societies", of which perhaps 80 per cent were in a state of insolvency, and through which, until that time, some millions of wage-earners had voluntarily been making their own provision against loss of earnings and the cost of sickness. Between these two objectives the doctors were at first almost totally ignored; only after the profession had shown a determined refusal to co-operate were terms eventually arranged which permitted the scheme to go into effect. One of the features of the compromise was the administrative separation of the cash benefits from the benefits in kind—for the doctors, remembering the German controversies, were fearful of dictation by the insurance societies, and of lay interference with their practices.

Many years of effort, development, and evolution have now built a system from which the ancient quarrels have almost completely disappeared. The plan has recognized traditions, and has attempted to follow largely the established customs of the people; it has not ridden rough-shod over prejudices, or made radical changes in accepted methods by intolerant insistence. The result is that today the scheme is looked upon in Britain with very general favour—though naturally there are still criticisms, and frequently it is admitted that the organization may not be ideal. The British methods have been so widely publicized, however—even to the suggestion that they should be adopted with little change in the Dominions—that it is important for the medical profession in this country to be familiar with its main principles, advantages, and weaknesses. These will consequently now be summarized.

The plan covers all manual workers, and non-manual workers who earn not over £250 per annum, between the ages of 16 (recently extended to 14) and 64. The contributions normally are 9d. weekly for men and 8½d. for women, of which 4½d. in each case is paid by the employer; the Government pays into the scheme one-seventh for men, and one-fifth for women, of all expenditures on benefits and local administration, and the entire cost of central administration, with various special grants from time to time. The cash "sickness benefits" become payable after contributions have been made for at least 6 months, while reduced benefits only are paid during the next 18 months; they are provided from the 4th day to the end of 26 weeks of illness, at the rate of 15s. per week for men, 12s. for single women, and 10s. for married women. After the 26 weeks have been exhausted, and so long as membership has existed for 2 years, a reduced "disablement benefit" of 7s. 6d. weekly for both men and women becomes payable as long as incapacity continues but not beyond age 65. A "maternity benefit" (after 42 weeks of membership) is paid amounting to £4 if both parents are insured or if only the wife is insured, or £2 if only the husband is insured or if the woman is unmarried. "Medical benefits", also, are provided from the first until the last day of insurance, and include medical treatment falling within the competence of the general practitioner in his office and in the patient's home, and drugs and approved appliances.

The plan is operated through about 800 "Approved Societies"—old friendly societies, and new societies formed specially to work under the Acts, which are "approved" by the authorities. With their branches they comprise about 6,000 administrative units, with wide variations in membership from very small numbers to upwards of 2,500,000. Many of the societies which were granted approval in the early days of the scheme, but which could not maintain the required financial standards, have ceased to exist, and amalgamations of the smaller societies have gradually reduced the total number. Even with these reductions, however, the multitude of societies still causes much overlapping of effort; and the fact that each society is free to select its own members and to administer its own affairs (under supervision) produces inequalities in their financial fortunes. These inequalities become apparent at the quinquennial actuarial valuations; the prosperous societies (covering about half the total membership of the system) are then permitted to distribute "additional benefits", which usually take the form of increases in the weekly cash sickness benefits, dental, ophthalmic, or nursing treatment, hospital care, or

discretionary grants in cases of distress. The precise benefits, whether in cash or in kind, which any insured person will receive are thus governed initially by a minimum scale, which is enlarged only if the society to which he belongs shows a low rate of sickness claim, efficient administration, and therefore good financial results. Such a plan of operation evidently must encourage the insured persons themselves to supervise claims and to check malingering—in that respect, indeed, it is based soundly upon one of the best-known principles of sickness insurance administration, namely, that the co-operative efforts of those who are insured can be made to operate as a control against excessive rates of claim. The unequal benefits in the different societies, however, have given rise to a great amount of criticism, and the abolition of the societies was urged upon a Royal Commission in 1926. The majority of that Commission expressed the view, nevertheless, that they could see no adequate alternative to the societies under the conditions which had governed the evolution of the British plan. It is worthy of note, however, that in 1933 the Irish Free State did abolish them, and has substituted one unified society covering nearly everybody insured under the scheme.

The administration of the medical benefits is in the hands of local "Insurance Committees", which are wholly separate and distinct from the Approved Societies. The doctors and pharmacists who are prepared to furnish the required services place their names upon a "panel", and may of course continue private practice. The panel physician is remunerated through a "capitation fee" based on a payment of 9s. per annum in respect of each patient on his list (although the sums thus distributed are estimated on a national basis, with certain adjustments, so that the individual practitioner does not necessarily receive always this exact amount). A doctor working alone may not accept the cards of more than 2,500 insured persons; for each assistant he employs he may, however, add another 1,500 to his list. In the rural areas a mileage allowance is granted if a patient lives more than two miles from the doctor; and the country doctor, who in England and Wales is required to supply drugs and appliances himself, receives for their provision a capitation allowance of 2s. 3d., with special payment for certain expensive items. The insured person is entirely free to choose his doctor, and may change to another at any time. The druggists are remunerated through the Insurance Committees on the basis of a set prescribing fee with a reasonable profit on the drugs used.

In a short article it is quite impossible to include any further description of the administrative details of this system. Many of the problems which arise, however, are indicated by a recital of the criticisms and advantages which nearly thirty years of operation have brought to light. It has been said that the Approved Societies are superfluous; it is replied that they were at first essential, that they have given financial stability to the whole system through their actuarial supervision and experienced administration, and that they form an indigenous part of the economic life of a wage-earning class which in England still even prefers inequalities to regimentation. It is urged that the cash benefits occupy too large a place, and that the emphasis is laid on the financial compensation of illness instead of on prevention and the best modern treatment. The 2,500 names permitted on a doctor's panel are said to be too large; some contend that patients are run through the doctor's office with a minimum of attention, and consequently that the number should be reduced to 1,500 or 1,200—a suggestion which is partly answered by the fact that no wide agitation has developed, and that competent observers give a high rating to the thoroughness of the experienced insurance doctor. Over-certification of illness, in order to substantiate claims to the cash benefits, and excessive prescribing, are alleged, and the "bottle habit" is condemned—yet certification and prescribing are controlled elaborately by salaried Regional Medical Officers, and the standards of the medical profession in Great Britain would hardly permit bottles of medicine for long to displace proper diagnosis. The capitation fee has given rise to several controversies; some think that now it should be raised to 12s. 6d.—but again there are many who will say that 9s. is sufficient, given a good office organization and experience in the somewhat special type of practice which the Acts inevitably require. The maternity benefit, also, is criticized as being unique in providing only cash, which can be dissipated easily, without any medical services at all.

Those are the more trivial discussions. There are others which strike more seriously at the whole structure of the scheme. Mainly, they concentrate on the view that the plan is not adequate—that it is incomplete, and that therefore it should be enlarged. It is pointed out that there is only slight emphasis upon prevention, and that there is practically no co-ordination with public health measures; that, except for uneven and inadequate coverage through the "additional benefits", which may or may not be forthcoming, there is no hospitalization, no dental, ophthalmic, or nursing services for the insured, and no provisions for securing specialists' advice; that the failure to include the dependents of insured persons is particularly serious; and that independent workers, who are not paid by an employer, are excluded. Most of these omissions are indeed obvious enough, and have been pointed out again and again—in the discussions before the Royal Commission of 1926, by the British Medical Association itself in its official support

of an enlarged scheme, in the valuably independent "Report of the British Health Services" published at the end of 1937 by "P.E.P." (Political and Economic Planning), and by practically all unprejudiced observers.

It would seem clear, accordingly, that this analysis should be taken as a warning that the introduction of the British method in Canada would encounter unanswerable opposition unless it were modified so greatly that it would be practically unrecognizable. The background of the Friendly Societies is not here in any comparable degree; the emphasis in Canada undoubtedly would be upon benefits in kind rather than benefits in cash; a service much more complete than the present British plan would be demanded. Yet the long experience of the British scheme has provided four other valuable lessons—firstly, that sickness insurance on a wide scale can be operated under Government direction with financial success (for the plan, unlike the much more elusive insurance against unemployment, has not there encountered financial troubles); secondly, that it is essential to maintain very careful medical and actuarial control; thirdly, that the success of such a plan can be assured only by the informed co-operation of the medical profession; and fourthly, that in the remote and sparsely settled districts it may be necessary to change entirely the whole character of any scheme—a "Highlands and Islands Medical Service" in Scotland having been evolved to deal specifically with the problems of the far-outlying populations.

OTHER EUROPEAN HEALTH INSURANCE LEGISLATION

The establishment of the German system in 1883 was followed by the introduction of governmental health insurance plans in Austria in 1888, in Hungary in 1891, and in Norway in 1909. After the British scheme of 1911, compulsory plans were set up also in Switzerland, Russia, and Roumania before the Great War. The economic re-arrangements which followed that conflict, and the publications of the International Labour Office, then stimulated action in many of the smaller countries (Bulgaria, Czecho-Slovakia, Greece, Jugo-Slavia, Latvia, Lithuania, Luxembourg, Poland, and Portugal); and France adopted a plan in 1930. In addition to these compulsory systems, various types of voluntary plans have been either sponsored or assisted by the Governments in Sweden (since 1891), Denmark (since 1892), Belgium (since 1894), and to a less important degree in other countries. To complete the record, it may be added that outside Europe compulsory plans have also been established in Chile and Japan, while voluntary action has developed a system in Argentina.

The evolution of the idea of governmental action is thus essentially a European development, arising to a great extent from the special economic circumstances of that Continent. Invariably it has aimed at dealing with certain wage-earning groups only; the pattern followed has been sufficiently uniform, indeed, that space need not be taken here to reiterate either the principles or details. Comment need be made only on three interesting features of the discussions and plans of Denmark, Switzerland, and France.

The Danish methods show an interesting determination to follow independent thinking. Starting as a voluntary system, and by thrifty and cohesive development eventually embracing a larger percentage of the population than any other compulsory or voluntary plan, it has been notable throughout for the manner in which it has stimulated action by government subsidies to voluntary societies, and by co-operative inspection of their activities. The diffused initiative of the people has been assisted and directed; their citizenship is viewed by all classes as an honourable status which imposes obligations to serve without compulsion, and the right to government assistance on conditions only; their liberties have been conserved; their traditions have not been violated. In keeping with this spirit Denmark is unique in having almost every practicing physician as a member of the Danish Medical Association, which in turn is responsible to the citizens and the State through provisions that only its members may practice with insured persons, and that every contract with a medical practitioner must receive the approval of the Association. With this widespread experience in co-operative effort, registration with a sickness fund and the payment of contributions were made compulsory in 1933 for all citizens between the ages of 21 and 60, although certain of the essential features of its voluntary evolution were retained. The Danish system covers a larger proportion of the population, and places less emphasis upon cash benefits, than any of the other national systems—for about 70 per cent of the adult population are members of the state-supervised insurance societies, and the benefits in kind represent about 80 per cent of the total expenditures. Employers do not contribute; the insured persons themselves pay about 70 per cent of the total costs—the State providing the remainder.

The course of the discussions surrounding health insurance in Switzerland is instructive on account of that country's federated constitution. A proposal that a compulsory plan should be introduced on a national scale was adopted overwhelmingly by the National Council and the Council of the States; but on a referendum it was rejected by the people. The problem was eventually solved by the delegation of power to the Cantons, coupled with a system of subsidies which have produced different

schemes in the various Cantons. No contributions are made by the employers.

In France the situation has always been notable for the strategic position which has been maintained by the medical profession. Undertaking a well-informed campaign prior to the introduction of proposals for a compulsory plan in 1928, the profession succeeded in excluding many features which were thought to be objectionable on the basis of experience in other countries, or to be incompatible with medical secrecy. The French plan includes cash benefits for loss of wages due to illness, but insures its members against a portion only of the costs of medical care. The insured person himself first pays for his medical services, on the Medical Society's scale thought appropriate by his physician, and then applies to his insurance fund ("caisse") for a reimbursement, which, however, is made only up to 80 per cent or 85 per cent of agreed rates for specified types of service, and depends upon the average basic wage of those insured in his "caisse". In theory, at least, the physician has thus retained his intimate responsibilities—he certifies disability, but is not required to reveal his diagnosis; he receives neither salary nor capitation fee, but his own fees; he is independent of the insurance authorities, and free from lay control. Yet checks upon this apparent liberty have grown up automatically—for marked differences between the doctor's charges and the reimbursement by the "caisse" lead to dissatisfaction and complaints, which bring investigation and control, and have hastened the appointment by the "caisses" of their own doctors to check the original treatments and accounts.

LEGISLATION IN THE BRITISH EMPIRE OUTSIDE BRITAIN (EXCLUDING CANADA)

Three points only need be mentioned here. The first is that in Australia a large amount of controversy has been occasioned since 1937 by a report of Sir Walter Kinnear, of the British Ministry of Health, proposing the adoption in Australia of a health insurance plan following the "Approved Society" method of Great Britain. Secondly, much discussion has been aroused in New Zealand over recent legislation of a very advanced type. In South Africa, lastly, the "Collie Report", recommending a contributory insurance scheme for urban communities and a type of state medicine for rural areas, once again has brought the problem to the fore. The arguments surrounding these suggestions, however, have not elicited any new important factors. Readers who may be interested will find full accounts in the Report of the Committee on Economics at the Annual Meeting of the Canadian Medical Association in Montreal, June, 1939.

A Medical Services Plan for British Columbia

An important step is being taken by the medical profession in British Columbia. A Medical Services Plan has been worked out, and a complete outline of the scheme has been sent to all the papers in the province to be released on February 10th. It amounts to a scheme by which groups of ten or more employees in any industry may obtain complete medical and hospital care on a voluntary basis, comparable to that obtained by such groups of employees as the B.C. Telephone Co., B.C. Electric Railway Co. and the Vancouver School Teachers' Federation. An association will be formed which will act as a centralizing agent for all small groups. It will be operated without profit; will give free choice of doctor and hospital; will be limited at first to Greater Vancouver and New Westminster; will apply only to employees earning at the rate of $2,400.00 or less per annum, and will include dependents if so desired.

The plan has been approved by the British Columbia Medical Association and is now being offered to the public. Fuller details will probably be given at a later date.

PRINTERS' SKIN AILMENT.—The necessity of strict attention to the prevention of skin eruptions among plate printers due to inks and cleaning materials, is brought out by P. A. Neal, M.D., Washington, D.C., in *The Journal of the American Medical Association* for February 17, 1940. Dr. Neal's study of 318 plate printers and their 47 assistants showed that a considerable percentage had suffered for many years from recurrent skin lesions of the hands and arms. By applying to the skin a patch of the different inks and cleansing materials used to clean the plates and the hands and arms of the workers, Dr. Neal proved that these substances were the cause of the eruptions. In addition to recommending complete pre-employment examinations for plate printers and periodic examinations thereafter, with particular attention being paid to evidences of skin diseases, the author suggests that workers handling cleaning fluids should wear rubber gloves and that clean towels and clean aprons should be furnished to the workers daily. The use of a common oil trough or of strong cleaning agents and alkalis should be discontinued. Shower baths and wash rooms should be scrubbed daily with soap and hot water. Individual paper sandals should be furnished workers using the shower baths, and separate lockers for work clothes and street clothes should be furnished plate printers to prevent soiling the street clothes with the inks and other substances capable of producing dermatitis.

I esteem a habit of benignity greatly preferable to munificence. The former is peculiar to great and distinguished persons; the latter belongs to flatterers of the people, who tickle the levity of the multitude with a kind of pleasure.—Cicero.

Be discreet in your discourse, but much more in your actions; the first evaporates, the latter endure for ever.—Phocylides.

Retrospect

ERYTHRÆMIA— POLYCYTHÆMIA RUBRA VERA*

BY DUNCAN GRAHAM, M.B., F.R.C.P.(C.), F.R.C.P., F.R.S.(C.)

Toronto

We are assembled here today to do honour to the memory of William Osler. In reserving this hour on our scientific program for the discussion of four diseases, subjects of special study by Osler, and in which he made important contributions to our knowledge, we would remind ourselves of our debt to him as practitioners of medicine and pay humble tribute to the memory of a master physician.

When Osler observed in a patient a new phenomenon of disease or an unusual combination of common signs and symptoms his interest was aroused. As Thomas McCrae remarked, in speaking of the influence of pathology on the clinical medicine of William Osler: "He stored mentally the many examples of this and that peculiarity which came under his observation, so that when subsequent similar examples were seen he was able to bring both the clinical features and the pathological findings to aid in the solution of the case in hand." His publications on erythræmia provide a fine example of his method of approach and the working of his mind in the solution of obscure clinical problems. It was the association of polycythæmia with a common sign of disease, cyanosis, that first attracted Osler's attention to the condition we now recognize as polycythæmia rubra vera or erythræmia.

At a meeting of the Johns Hopkins Medical Society in November, 1902, Osler[1] reported upon certain forms of cyanosis with polycythæmia. He presented two cases of superficial cyanosis with a very remarkable blood condition, over 10,000,000 red blood cells, with a hæmoglobin as high as 115 per cent and no change in the white blood cells. He called attention to the fact that the cyanosis in these two cases was not associated with congenital or acquired heart disease, pulmonary disease, or Raynaud's disease. Its origin was obscure. He stated that this rare condition had been referred to a year before by Cabot, of Boston, and by Saundby, of Birmingham. The following year another communication appeared from him, entitled "Chronic cyanosis with polycythæmia and enlarged spleen—a new clinical entity",[2] in which the clinical history, the physical and hæmatological findings in 9 cases of this obscure form of superficial cyanosis were reported; 4 of these cases had come under his own observation and 5 similar cases had been reported in the literature. Then followed an analysis of the signs and symptoms present in the nine cases and a discussion of their clinical significance. He states: "The condition is characterized by chronic cyanosis, polycythæmia and moderate enlargement of the spleen. The chief symptoms have been weakness, prostration, constipation, headache and vertigo." He realized that the symptoms were rather indefinite, but was convinced that the association of chronic cyanosis with polycythæmia and enlarged spleen was a clinical picture that did not conform to any known disease. He, therefore, discussed in greater detail the clinical significance of these three findings.

He first excluded congenital and acquired heart disease, chronic diseases of the lungs, and poisoning by coal tar products as possible causes of chronic cyanosis in the nine cases reported. He pointed out, too, that in cases of chronic cyanosis due to these well-recognized causes the red blood count is not increased or only to a moderate degree, and never reaches a level as high as is found in this new clinical entity. He then discussed the known causes of relative and of absolute, or true, polycythæmia, and concluded from his observations that a true polycythæmia was present in the cases reported. In the examination of the blood in his cases he noted an increased viscidity or viscosity of the blood and suggested that difficulty of bloodflow resulting from increased viscosity of the blood seemed the most plausible explanation of the chronic cyanosis.

With reference to the enlarged spleen, Osler observed that, of the 9 cases 7 had enlargement of the spleen, and in 4 the enlargement might be termed great, the spleen reaching nearly to the navel. He came to no definite conclusions as to the relationship of the polycythæmia and chronic cyanosis to the splenomegaly. After calling attention to two cases of splenomegaly and moderate polycythæmia, one reported by Rendu and Widal and one by Moutard-Martin and Lefas, in which the spleen was found to be tuberculous, Osler expressed the opinion that the enlarged spleen in his cases might not be anything more than the effect of chronic passive congestion.

In November, 1907, at the Radcliffe Infirmary at Oxford, Osler gave a clinical lecture on "Erythræmia (polycythæmia with cyanosis, maladie de Vaquez)".[3] He began the lecture with these words: "It is interesting to follow the stages in the recognition of a new disease.

* Read at the Seventieth Annual Meeting of the Canadian Medical Association, the Osler Hour, June 23, 1939.

Very rarely does it happen that at all points the description is so complete as at once to gain universal acceptance. This has been the history of a very remarkable malady of which the patient before you is the subject.'' He referred then to previous publications on this disorder, and mentioned that at least seventy cases were on record. He pointed out that Vaquez,[4] in 1892, described the first case as a condition of hyperglobulism with cyanosis, which he attributed to overactivity of the blood-forming organs, and that Saundby and Russell,[5] in reporting the fifth case in 1902, were the first to realize that the condition was ''a definite clinical entity and one which was new to medical science''.

The first complaint of the patient presented by Osler on this occasion was pain in the hands and feet; later, he complained of weakness, then swelling of the abdomen, and, still later, of cyanosis which was more marked in cold than in warm weather. In his physical examination of the patient Osler called particular attention to the presence of general cyanosis, dilated venules on the nose and cheeks, dilatation of the superficial veins, petechiæ on the lower limbs, and enlargement of the spleen, and to the absence of findings suggestive of congenital or acquired heart disease or emphysema. He then gave a report of the hæmatological and urinary findings. The urinalysis showed a small amount of albumin and a normal amount of pigments. The red blood count varied from 9,200,000 to 9,710,000 and the hæmoglobin from 130 to 160 per cent; the white blood count was 24,000; the blood smear showed a number of nucleated red but no immature white blood cells. The ratio of red blood cells to plasma in the blood, as shown by the hæmatocrit, was approximately 76:18, as compared with a normal ratio of 48:48. In this connection he pointed out that post-mortem examinations of cases of erythræmia had shown the vessels to be in a state of great fullness and engorgement, and that, in a case of Parkes Weber, Haldane had estimated the blood volume and found it to be about double the normal. These findings afforded additional proof for Osler's earlier contention that, in this disease, the polycythæmia is absolute and not relative.

Osler then discussed in greater detail the triad of symptoms upon which a diagnosis of erythræmia can usually be made, namely, polycythæmia, cyanosis and splenomegaly. With reference to splenomegaly he pointed out that it is present in a large proportion of the cases and the spleen may reach the ilium, that it may precede the occurrence of cyanosis, or that it may not have been noticed during life and yet be found on post-mortem examination.

In referring to the cyanosis which he found in the great majority of cases he called attention to the effect of the environmental temperature on the colour of the skin of patients with erythræmia, pointing out that a patient may be as ''red as a rose'' in the hot summer and be ''indigo blue'' in the cold winter. He then discussed the factors affecting the colour of the skin, both in health and disease. He stated that the colour of the skin in health depends on two circumstances, the degree of fullness of the peripheral vessels and the rate of circulation in them. He pointed out that a patient might have general pallor and appear anæmic with a normal blood count, or have a good colour with a blood count of 2,000,000, depending upon the fullness of the venules of the skin, and drew attention to the remarkable difference in the fullness of the cutaneous vessels of different persons, and, more particularly, between those living in a cold, damp climate and those in a warm, dry climate. Chilblains, common in damp, cold climates, he considered to be an expression of extreme local congestion under the influence of cold.

He then demonstrated the effect of rubbing and of warm water on the cyanosed hands of his patient to show the influence of the rate of blood-flow on the colour of the skin. The increased rate of blood-flow resulting from rubbing and from heat caused a disappearance of the bluish colour and the return of a pink or red colour to the skin. He stated that cyanosis resulted from a slowing of the blood-flow in capillaries filled with blood. He also pointed out that the skin might be white in the presence of slowing of the blood-flow if the smaller arteries, arterioles, capillaries and vessels were contracted as in the white fingers often seen in Raynaud's disease. Having called attention to the fullness of the capillaries and venules in his patient, he referred to the increased viscosity of the blood in erythræmia and showed how this abnormal state of the blood would decrease the rate of flow through the capillaries and venules and thereby favour the development of cyanosis in patients with erythræmia.

In reference to the patient's complaint of pain in the hands and feet, he remarked that the association of pain in the hands and feet with extreme congestion of the cutaneous blood vessels suggested the erythromelalgia of Weir Mitchell. The presence of pigmentation of the skin in certain cases he considered to be the result of persistent hyperæmia of the skin. He stated that many additional features of the disease had been noticed, such as headache, a distressing sense of fullness, occasional attacks of vertigo or nausea and vomiting. He commented upon the frequent occurrence of hæmorrhages: hæmatemesis, hæmoptysis and hæmaturia, and cerebral hæmorrhage, which resulted in death in some instances.

He then discussed the pathological findings in the fatal cases reported in the literature. The most important and most significant were fullness and engorgement of the veins, intense

hyperplasia of the bone marrow, and enlargement of the spleen, with histological changes indicative of chronic passive congestion.

As to the cause of polycythæmia, he pointed out that no satisfactory clinical or pathological evidence had been produced to support the conception of increased formation or delayed destruction of red blood corpuscles as the factor responsible. He referred to the analogies with leukæmia—the increased number of cells in the circulating blood, the increased blood volume, and the increased activity of the bone marrow. Speaking of the name of the disease, he stated: "In many ways the name 'erythræmia', suggested by Turk, of Vienna, seems to be the most appropriate. It is short, and it designates the most striking and the most constant peculiarity; it has the advantage of an analogy with leukæmia, and both affections are associated with states of morbid activity of the bone marrow." Lastly, he commented upon the treatment of the condition. He reported that repeated bleedings afford relief for fullness in the head and vertigo, and that x-ray treatment reduces the size of the spleen but does not affect the cyanosis.

Contributions to our knowledge of erythræmia since Osler's last communication in 1908 may be referred to under three main headings: (1) treatment; (2) hæmatological findings; (3) vascular disturbances. In the treatment of this disease repeated bleeding has remained the most effective method for the temporary relief of fullness in the head, headache and vertigo. As an increase in the number of red blood cells in erythræmia is responsible for the troublesome disturbances present, chemicals known to cause destruction of red blood cells have been employed in treatment. Benzol, introduced by Koranyi in 1912 for the treatment of myeloid leukæmia, was tried, but, on account of its prolonged or cumulative action and its toxic effect on the bone marrow, particularly on the white blood cells, its use was discontinued. In 1918 Eppinger and Kloss introduced phenylhydrazine, a drug having a similar action on the red blood cells but less toxic for the white blood cells and platelets than benzol. The usual plan of treatment recommended is to give the patient a daily dose of 2.5 to 5 grains in capsules by mouth until he has received a total dosage not greater than 45 grains. If the patient has reacted favourably during the course of treatment and for a further period of two weeks without the drug he is placed on a weekly maintenance dose of 1 to 5 grains. The drug is contraindicated in bed-ridden patients and in those over sixty years of age or with advanced arteriosclerosis.

As the action of the drug is prolonged for a week or ten days after stopping medication, and as individual patients respond differently to the same dose of the drug, all patients should be in hospital and treatment controlled by daily blood counts during the initial treatment and until a suitable maintenance dose of the drug has been determined. When phenylhydrazine treatment has been properly supervised many patients have shown a satisfactory response. More recently acetyl-phenylhydrazine has been recommended in place of phenylhydrazine. Unless treatment with these drugs can be properly controlled by blood counts at suitable intervals they should not be employed. Splenectomy is contraindicated.

Since 1908 valuable experience has been gained in the treatment of erythræmia by x-rays. If irradiation therapy is properly controlled, it produces in most instances not only a decrease in the size of the spleen but a significant decrease in the number of red blood cells, and a definite subjective improvement in the patient's symptoms. Although the treatment has to be repeated at intervals, depending upon the response of the patient, the x-ray is probably the most satisfactory method of treatment for erythræmia at present known. Treatment by phenylhydrazine and by irradiation, when properly controlled, often produces a striking relief of symptoms and may prolong life. As far as the cure of the disease is concerned, one must agree with the conclusion of Osler: "We have nothing at our disposal which controls the morbid processes in the bone marrow".

In the past two decades a number of observers have called attention to the frequent occurrence of immature white blood cells in the peripheral blood during the terminal stage of the disease. A moderate leucocytosis of 20,000 is a usual finding but, in certain cases, the leucocytes may increase to 100,000 or over. The differential count shows an increased percentage of immature polymorphonuclear leucocytes, including a small percentage of myelocytes. In one of our cases of erythræmia, chronic myeloid leukæmia had been diagnosed three years before the patient came under our observation. In rare instances a combination of erythræmia and myeloid leukæmia may be present. In a series of fifteen cases of erythræmia observed by Minot and Buckman,[6] three developed definite anæmia after many years of polycythæmia, and both immature red and white blood cells were found in the blood. In all their cases of erythræmia the red blood cells showed some abnormalities; in a number of cases the blood showed immature red cells, and, not uncommonly, immature white cells were present. Our own observations confirm these findings. Approximately 24 per cent of our cases of erythræmia in the terminal stage of the disease have had a definite anæmia with many immature red blood cells and often immature white blood cells in the peripheral blood. In one of our fatal cases extramedullary red blood cell formation of an extreme type was found at autopsy.[7]

Although Osler did not refer to the development of anæmia or to the presence of immature white blood cells in the final stage of the disease

these hæmatological findings and the occurence of extramedullary red blood cell formation seem to emphasize further the close relationship of erythræmia and myeloid leukæmia, to which he called special attention. The cause of erythræmia, like that of myeloid leukæmia, still remains undetermined, but there is general agreement with the view expressed by Vaquez, and later strongly supported by Osler, that erythræmia is a primary disease of the bone marrow.

The vascular disturbances which play such an important rôle in the causation of many of the symptoms of erythræmia have been a subject of special study in recent years. Brown and Giffin[8] have shown that the increased blood volume present in erythræmia is due almost entirely to the increased number of red blood cells and not to an increase in plasma volume. They have found that the vascular system accommodates this increased blood volume, first, by engorgement of the internal organs — spleen, liver and large veins; with progress of the disease and a greater increase in blood volume, the peripheral veins, and, lastly, the venules and capillaries of the skin and mucous membranes dilate. They found engorgement of the retinal veins in 64 per cent of their cases and commented on its diagnostic importance. Using Lombard's method for the study of the nailfold capillaries, in the stage of capillary engorgement they found the capillaries longer than normal and all the capillaries filled with blood, with distension more marked in the venous than in the arterial end of the capillary loop. They were able to show that the velocity of the capillary flow in erythræmia is definitely slower than normal and that complete stasis may occur upon exposure to cold. These writers agreed with Osler that increased viscosity of the blood is an important factor in causing slowing of the capillary blood-flow. They observed that the red blood cells had a bright red colour when observed at room temperature of 20 to 30° C., but with further slowing or with complete stasis of the capillary stream from exposure to cold these cells had a bluish tinge. In this connection, you may recall Osler's observation of a patient being "red as a rose" in summer and "blue as indigo" in winter.

These and similar studies in the same field by others have given us a more exact knowledge of the nature and character of the vascular disturbances present in erythræmia. At the same time, the results of these investigations serve to confirm the fundamental observations of Osler.

As we review Osler's contributions to our understanding of erythræmia and consider them in the light of subsequent additions to our knowledge of the disease, we marvel anew at the accuracy of this great physician's observations and at the soundness of his interpretations of new phenomena of disease.

REFERENCES

1. OSLER, W.: Certain forms of cyanosis with polycythæmia, *Bull. Johns Hopkins Hosp.*, 1903, 14: 91.
2. *Idem*: Chronic cyanosis with polycythæmia and enlarged spleen: a new clinical entity, *Am. J. M. Sc.*, 1903, 126: 187.
3. *Idem*: A clinical lecture on erythræmia (polycythæmia with cyanosis, maladie de Vaquez), *The Lancet*, 1908, 1: 143.
4. VAQUEZ, H.: Sur une forme spéciale de cyanose s'accompagnant d'hyperglobulie excessive et persistent, *Comptes rend. soc. biol.*, 1892, 44: 384; and a supplementary note, *Soc. méd. des hôp. de Paris*, 1895, 3 ser., 12: 60.
5. SAUNDBY, R. AND RUSSELL, A. E.: An unexplained condition of chronic cyanosis with the report of a case, *The Lancet*, 1902, 1: 515.
6. MINOT, G. R. AND BUCKMAN, T. E.: Erythræmia (polycythæmia rubra vera), *Am. J. M. Sc.*, 1923, 166: 469.
7. DUFF, G. L., HAMILTON, J. D. AND WIGMORE, F. H.: Polycythæmia vera. In press.
8. BROWN, G. E. AND GIFFIN, H. Z.: Studies of the vascular changes in cases of polycythæmia vera, *Am. J. M. Sc.*, 1926, 171: 157.

Men and Books

OSLER'S PATHOLOGICAL COLLECTIONS AND HIS LITERARY OUTPUT*

BY MAUDE E. ABBOTT, B.A., M.D., LL.D.

Montreal

THE MONTREAL PERIOD

William Osler came to McGill University from the Toronto School of Medicine in the fall of 1870, entering as an undergraduate in the third year of the course. At that time he was a slight, athletic, dark-complexioned young man of 21, of almost Spanish colouring, whose sparkling eyes, shining countenance, and quick reactions already revealed something of the quiet intellectual fire, unflagging enthusiasm, and broad human understanding that dominated and transfigured his later career. Born in 1849 in a country parsonage, in what were then the wilds of Upper Canada, of parents of exceptional force and sweetness of character, and the eighth of nine children, the spirit of unselfishness, generosity and fair play of that early environment, with the deep religious sense that its teaching infused, remained with him throughout life as an integral part of a naturally well-balanced character. In addition he came into medicine fresh from the influence of his first great teacher, Arthur Johnson, of Weston, a born naturalist of the White of Selborne type, who had trained him to the use of the microscope and had kindled in him a love of natural science that had already found expression in two publications.[1, 2] Al-

* A paper read at the Seventieth Annual Meeting of the Canadian Medical Association, Section of Historical Medicine, June 21, 1939.

ready, too, while still a medical student at Toronto, he had become immersed, as a natural sequence of his previous zoological studies, in the problems of comparative pathology, had collected and studied the ova of intestinal parasites, and had carried through an original experimental investigation into the mode of transmission and infestation of trichiniasis[3] in the human subject.

Arriving then at McGill in that year 1870 as a student armed with this rather special preparation, and the proud owner of a microscope (a rare possession in those days), Osler immediately attracted the attention and came under the influence of Dr. R. P. Howard, at that time Professor of Medicine and himself an enthusiastic clinico-pathologist and a great clinical teacher. From the first he must have been a diligent frequenter of the hospital deadhouse, for we find him in his final year as an undergraduate publishing several student case-reports, in one of which he gives a minute description of the "gross and microscopical appearances of the tumour",[4] and in another an account of an autopsy, evidently carried out by himself,[5] which reveals in its clear diction and meticulous accuracy of detail the same classic style so familiar to us in his later "Pathological Reports". Moreover, his graduation thesis was upon the self-chosen subject "Pathological Anatomy", and was awarded a special prize at the Convocation held on March 28, 1872, when "thirty-three microscopic and other preparations of morbid anatomy accompanying the thesis were presented by the author to the Museum of the Faculty".[6]

Osler's happy star continued to guide him during the two years of study abroad that followed immediately upon his graduation. After a little more than a year spent in the physiological laboratory of Sir John Burdon-Sanderson the opportunity met the man, for a kindly fortune took him to the Institute of Rudolf Virchow, the great founder of modern pathology as an exact science,[7] whose post-mortem technique he learned and whose method of instruction by the pathological conference he followed, applying both later in his own routine at McGill with extraordinary success. Of much value also was his experience in Vienna in the later weeks of his stay, when he visited the museum of the great Rokitansky,[8] whose genius had assembled an immense collection of rare specimens illustrating both ante-natal and post-natal pathology.

Returning to Montreal in 1874, thus equipped with a fundamental knowledge of disease processes and endowed with a natural faculty for imparting what he knew, William Osler almost immediately received the appointment of Professor of the Institutes of Medicine (Physiology and Pathology) at McGill University in April, 1875, at the early age of twenty-five. Shortly thereafter he was added to the teaching staff of the veterinary department of the school, was put in charge of the smallpox ward, and was appointed to the newly-created post of Pathologist to the Montreal General Hospital. This latter event was perhaps the most epoch-making of his entire career, for from it there resulted that mass of early observations based on over 1,000 autopsies performed by him during the ten years of his Montreal period, which undoubtedly laid the foundations of his later immense productivity.

His first Pathological Report from this hospital was published in book form (the first volume he saw through the press), and contains selected protocols from 100 autopsies made by him there during the year ending May 1, 1877. His second Report, covering autopsies done at that institution from the above date to October 1, 1879, was embodied in a larger volume[9] which appeared in 1880. Shortly after his departure for Philadelphia a third Hospital Report was issued by the late Dr. Wyatt Johnston[10] which lists by title 790 autopsies performed by Dr. Osler during his service at that institution (1876-1884).

A word upon his autopsy books is in place here. Originally there were five of these volumes, containing in all 787 protocols, but only two have come down to us. These are preserved at the present time in the Historical Medical Museum of McGill as the sacro-sanct possession of the University. Edited almost entirely in his own flowing hand, in a finished literary style that holds the attention of the reader, each case is a classic of its kind. Genius is writ broad upon these pages, and one stands spellbound before the straightforward evidence they yield of the perceptive power and selective faculty of a great observer. "So felt I as some watcher of the skies when a new planet swims into his ken".

The pathological collection. — William Osler was by nature and training a collector, and as a natural result of these activities the museum of the college quickly became the receptacle of a great number of valuable specimens, chosen from the wealth of pathological specimens the hospital afforded. Of these some 140 survived the ravages of time and are exhibited today in the museum on special stands mounted by modern methods but otherwise untampered with, so that each specimen, neatly chiselled down by him to show the lesion, bears silent testimony to his skill in dissection and discrimination of essentials, thus constituting a permanent memorial of great biographic significance. Moreover, practically every specimen in the collection has been made the subject of a published communication, and the majority of these have also formed the starting-point of a clinico-pathological research that culminated in later life in various additional important publications.

Over half of the material exhibited is from the diseases of the cardio-vascular system, which always held his special interest. Among these may be mentioned the following, as examples of

the characteristic way in which Osler's earlier experiences, reported upon at this time, lived on in his memory and eventually took their part in the production of a larger clinical concept: 2 specimens showing healed infarcts of the myocardium with extensive replacement fibrosis following thrombosis of the coronaries, with death from angina pectoris;[11] hypertrophy of the heart in prolonged muscular overstrain (probably hypertensive in origin);[12] 5 specimens of congenitally bicuspid aortic valve with superimposed subacute infective endocarditis, published in 1880 and made later, in 1886, the basis of an elaborate statistical study;[13] other cardiac abnormalities, 4 cases, including one of premature closure of the foramen ovale;[14] ball thrombus in the left auricle occluding a stenosed mitral valve;[15] obliteration of the inferior vena cava, of the portal vein and of the superior cava, 3 specimens from cases published in 1879-82, and followed in 1903 by an important paper[16] reporting a new case of the latter condition and again referring back to the instances of obliteration of the great veins studied and reported on by him from the Montreal General Hospital.

Osler's first communication on his great specialty of malignant or ulcerative endocarditis,[17] as it was then called, appeared in 1881, and it was presented by him also before the 7th International Congress of Medicine held at London in that year. His Gulstonian Lectures[17] on this subject, delivered in the spring of 1885 at the beginning of his Philadelphia period but based entirely on his rich Montreal experience, presented a magnificent exposé of the gross and histological features of this fell disease, with discussion of its etiology, and were enthusiastically received as "containing the first comprehensive account of the subject in English". They were illustrated by 23 carefully prepared specimens obtained from personal cases in the autopsy room of the Montreal General Hospital, and of these 15 (being 13 of the subacute infective type and 2 of the fulminating acute form), are preserved today in this museum, constituting its greatest treasure. His article on "Chronic Infectious Endocarditis"[17] published twenty-four years later, but still based entirely upon these early cases seen here, reported upon the chronicity of many severe cases and described all the characteristics later classed by Libman as the subacute bacterial form, so that the latter author rightly designates this as the "Osler-Libman" type of the disease.

Among the specimens of this series is one of subacute infective mitral endocarditis with death from cerebral embolism in a child of 11, giving a history of repeated attacks of chorea, which is of especial interest as being one of several cases seen at this time which supplied the text for one of the most important contributions of his Philadelphia period, that on the etiological bearing of chorea[18] on the development of chronic valvular disease.

The largest group on the stand, and the most important from the bio-bibliographic standpoint, as constituting the most prolific source of Osler's early clinico-pathological experience, is that of aneurysms, which, in that day before the discovery of any adequate pharmaceutical therapy, was of the most varied and dramatic kind. Thus, of a series of 28 specimens preserved here, we find 1 of the aortic sinus of Valsalva, 6 of the ascending and transverse arch rupturing respectively into the right pleura, into the trachea, into the right bronchus, into the pericardium, into the pulmonary artery, and, externally, on the surface of the chest; 2 of the descending thoracic aorta rupturing into the œsophagus, and 1 in this situation into the left pleura; 1 of the abdominal aorta rupturing into the duodenum; 1 of the anterior communicating artery into the meninges at the base of the brain, and 1 of the middle cerebral into the substance of the latter; perforation of the sternum took place in 1 case and erosion of the vertebræ in 2 others; as also death by suffocation from pressure on the trachea of a small aneurysm on the arch of the aorta in another. On the other hand, there are two remarkable specimens of "healed" aneurysm in the collection, the largest of which, the size of a child's head, filled with laminated clot, terminated by rupture of a small secondary sacculation at the margin of the sac into the left bronchus. One of the points that intrigued him and his colleagues most in these early studies was the not uncommon latency of signs and the obscurity of symptoms in aneurysm of the descending thoracic aorta. In an article published in 1903, reviewing 14 cases occurring in this situation at the Johns Hopkins Hospital between the years 1890 and 1902, he harks back at the outset to two instances from his Montreal experience which were remarkable in this particular. In one of these, a gentleman aged 70, who had been under observation 14 years for obscure symptoms in the left chest without characteristic physical signs, and who was thought to have been suffering from some pulmonary condition that baffled diagnosis, the entire length of the thoracic aorta was found at autopsy to be the seat of two wide shallow aneurysms occupying two-thirds of its circumference, one of which was nearly filled with laminated clot, indicating "healing". The other case, an apparently healthy woman who died suddenly in early middle life, presented in the otherwise normal wall of the descending aorta a small mycotic aneurysm which had ruptured into the œsophagus, causing profuse fatal hæmatemesis. This subject of mycotic aneurysm enchained Osler's interest from his earliest days in pathology, and was a matter of intensive study with him well into his Oxford period. Two other cases in addition to that just mentioned occurred in his experience at the Montreal General Hospital. The specimen from one of these which is also preserved here shows a small

aneurysm the size of a pea surrounded by vegetations and is situated on the wall of the aorta just above the semilunar valves which are themselves the seat of a luxuriant outgrowth of subacute infective endocarditis.

Another important series of early observations which is also illustrated by specimens in the collection is that of cerebral aneurysms. His first case occurred in a post-mortem performed on a patient of Dr. John Bell in 1876. Some ten years later, in 1886, he published from Philadelphia a valuable article on this condition in which he reported upon 12 cases from his autopsy service at the Montreal General Hospital, 9 of which were in elderly persons and 3 in young subjects, aged respectively 6, 17 and 20 years. In 8 of these rupture had occurred with fatal hæmorrhage, but the remaining 4 were an accidental finding.[19] In a short "Addendum" published a month later in the same journal he relates 2 additional cases recently seen by him at the Philadelphia Infirmary for Nervous Diseases.

This immense clinico-pathological experience, derived almost entirely from his Montreal period, forms the main background of Osler's later voluminous publications on the general subject of aneurysm, which supply a vivid and colourful presentment of authoritative facts published both in his Practice, in his two large monographs on this subject (1907 and 1909), in his "Schorstein Lecture" and in the succession of shorter communications on individual cases that appeared above his signature throughout the years.[20]

His literary output.—Osler's literary ouput, as gleaned from an examination of his Bibliographies, comprises an immense mass of material published under many different literary forms and covering a vast array of topics in a wide variety of fields. An estimate of the exact number of his contributions is a difficult undertaking, for the reason that it is impossible to evaluate at first sight the varying significance of the individual items, as is well seen from his Chronological Bibliography,[21] in which original articles and monographs, editorials and book-reviews, autopsy reports and specimens presented, correspondence published and discussions reported, form together a heterogenous mass of publications of very different relative importance. In the Classified and Annotated Bibliography of his publications[22] compiled for the Sir William Osler Memorial Volume of the Museums Association, and which is now republished, revised and indexed with Addenda as a separate volume,[23] an attempt has been made to bridge these difficulties with what we feel are illuminating results. In the first place the material is here arranged in chronological order under the following sections or rubrics, seven in number: Natural Science; Comparative and Human Pathology; Clinical Medicine; Literary Subjects; Medical Education; Public Welfare; and Volumes Edited. Secondly, all references published in different places but presenting the same contribution are assembled in a single paragraph, thus eliminating overlapping; and, thirdly, the titles of articles or other original material are printed in heavy black type, and all reported items in lighter face. A computation made on the basis of the above arrangement must come very close to the truth and should permit of a fairly exact evaluation of Osler's relative productivity in various fields and at different periods. Such an analysis has been carried out by the writer with the help of this new edition of the Classified Bibliography, and it shows in all some 1,551 items, of which 482 are original articles or monographs, which figure includes 28 system articles and 13 books, as well as numerous lectures or addresses delivered under foundations or before societies, many of which are fundamental contributions to the subjects treated; 211 are reports of pathological specimens presented at societies and 160 are autopsies published separately or in articles of other contributors; 88 are short original articles, most of which appeared under the titles of "Notes and Comments", "Ephemerides", and "Men and Books"; 160 are editorials (mostly written in his Philadelphia period), and 40 are book reviews. Other items include 35 obituary appreciations, 90 published correspondence, 112 remarks in discussions, and a few reports of society meetings or commissions. In addition, he edited and saw through the press the nine successive editions (exclusive of the four translations into foreign texts) of his great Practice of Medicine and the three editions of Osler and McCrae's Modern Medicine, as well as his collected essays published under the titles "Æquanimitas" and "The Alabama Student", and 6 modest volumes edited by himself during his Canadian Period, these being the First Pathological Report of the Montreal General Hospital (1877), the first (and only) volume of Transactions of the Canadian Medical Association (1878), the Clinical and Pathological Reports of the Montreal General Hospital, Vol. 1, and two volumes of Transactions of the Montreal Medico-Chirurgical Society (1882-1883 and 1883-1885).

This extraordinary productivity extended over the entire span of Osler's professional life from 1872 on and it ran the full gamut likewise of his broad intellectual and philosophic activities. Thus in his earlier years at Montreal and Philadelphia his publications comprised a number of interesting studies in biology, veterinary science and physiology, as well as a mass of material in pathology; and his later life was still more prolifiic in literary and medico-educational and bio-bibliographic topics; these in addition to his many publications in the field of clinical medicine, which remains his greatest contribution both in point of size and number, and also, we believe, of epoch-making value. These latter

naturally bulk largest in his Baltimore period, when he stood at the head of the greatest medical clinic in North America, just as his Canadian period, during which for a period of ten years he did all the autopsies at the Montreal General Hospital, is richest in communications on pathology. The facts brought out in this study are shown in an interesting way in a series of charts in which Osler's publications are grouped (*a*) according to the period of his life in which they appeared, and (*b*) the subject matter with which they deal. Reproduction of these charts with a further discussion of the bio-bibliographic significance of the details so presented is reserved for a latter communication.

BIBLIOGRAPHY

1. Christmas and the Microscope. Hardwicke's Science-Gossip; an Illustrated Medium of Interchange and Gossip for Students and Lovers of Nature, Lond., 1869, 5: 44.
2. Canadian Diatomaceæ. *Canad. Naturalist & Quart. J. S.*, Montreal, 1870-71, n.s., 5: 142-151.
3. Trichina spiralis. *Canad. J. M. Sc.*, Toronto, 1876, 1: 134-135; 175-176.
4. Carcinoma mammæ. Removal by excision. (Under care of Dr. D. C. MacCallum). Reported by Mr. W. Osler. *Canada M. J.*, Montreal, 1872, 8: 108-109.
5. Pleuro-pneumonia with delirium tremens. Death. Autopsy. (Under care of Dr. D. C. MacCallum). Reported by Mr. W. Osler. *Canada M. J.*, Montreal, 1872, 8: 119-122.
6. Graduation thesis on pathological anatomy. (Unpublished). Statement in *Canada M. J.*, Montreal, 1872, 8: 473-474.
7. Berlin correspondence. *Canada M. & S. J.*, Montreal, 1873-74, 2: 231-233; 308-315.
8. Vienna correspondence. *Canada M. & S. J.*, 1873-74; 2: 451, 456.
9. Montreal General Hospital Reports, Clinical and Pathological. Edited by William Osler, M.D., M.R.C.P., Lond., 1880, 1: 369 pp.
10. Montreal General Hospital Pathological Reports. No. III. Compiled by Wyatt Johnston, D. D. MacTaggart and F. L. Johnston. 1883-1895, 108 pp.
11. Case of fibroid disease of heart (angina pectoris). *Canada M. & S. J.*, Montreal, 1879-80, 8: 532-534.
    Lumleian lectures on angina pectoris. *The Lancet*, 1910, 1: 697-702; 839-844; 973-977.
12. Overstrain of the heart as illustrated by a case of hypertrophy and dilatation consequent upon muscular strain. *Canada M. & S. J.*, 1877-78, 6: 385-395.
    High blood pressure, its associations, advantages and disadvantages. *Brit. M. J.*, 1912, 2: 1173.
13. On the condition of fusion of two segments of the semilunar valves. *Montreal Gen. Hosp. Repts., Clin. & Path.*, 1880, 1: 232-242.
    The Bicuspid condition of the aortic valves. *Trans. Ass. Am. Phys.*, Phila., 1886, 1: 185-192.
14. Cases of cardiac abnormalities. *Montreal Gen. Hosp. Repts.*, 1880, 1: 177-192.
    Congenital affections of the heart. *Cycl. Dis. Child. M. & S.* (Keating), Phila., 1880, 2: 747-767.
15. Mitral stenosis—sudden death—ball thrombus in the left auricle. *Montreal M. J.*, 1896-7, 25: 729-731.
    Rare forms of cardiac thrombi. *Johns Hop. Hosp. Rep.*, 1890, 2: 56-61.
16. Case of obliteration of vena cava inferior with great stenosis of orifice of hepatic valve. *J. Anat. & Physiol.*, 1878-79, 13: 291-304.
    Case of obliteration of the portal vein (pylephlebitis adhesiva). *J. Anat. & Physiol.*, 1881-82, 16: 208-216.
    Obliteration of superior vena cava. *Canada M. & S. J.*, 1882-83, 11: 298.
    On obliteration of the superior vena cava. *Johns Hop. Hosp. Bull.*, 1903, 14: 169-175.
17. Infectious so-called ulcerative endocarditis. *Arch. Med.*, 1881, 5: 44-68.
    On some points in the etiology and pathology of ulcerative endocarditis. *Trans. Inter. Med. Congr.*, London, 1881, 1: 341-346.
    Gulstonian lectures on malignant endocarditis. *Brit. M. J.*, 1885, 1: 467-470; 522-526; 577-579.
18. Case of chorea with recent endocarditis. (Autopsy). *Canada M. & S. J.*, 1880-81, 9: 651-652.
    Cardiac relations of chorea. *Amer. J. M. Sc.*, 1887, n.s. 94: 371-386.
    On chorea and choreiform affections. Blakiston Son, Phila., 1894, 125 pp.
19. Case of cerebral aneurysm (with Dr. John Bell). *Canada M. & S. J.*, 1876-77, 5: 57-58.
    Aneurysm of anterior communicating branch of circle of Willis, rupture. *Canada M. Rec.*, 1879-80, 8: 112.
    Aneurysm of larger cerebral arteries. *Canada M. & S. J.*, 1885-86, 14: 660-666.
    Addendum to paper on cerebral aneurysms. *Canada M. & S. J.*, 1885-86, 14: 710-711.
20. Aneurysm of aorta; perforation into œsophagus. *Canada M. & S. J.*, 1881-82, 10: 501-502.
    Aneurysm of the descending thoracic aorta. Lippincott, Phila., 1903, 40 pp. Also: *Internat. Clin.*, 1903, 13: 1-40.
    Schorstein Lecture on Syphilis and Aneurysm. *Brit. M. J.*, 1909, 2: 1509-1514.
    Notes on aneurysm. *J. Am. M. Ass.*, 1903, 38: 148.
21. Bibliography of the Writings of Sir William Osler, Bart., M.D., F.R.S. (chronologically arranged). By Minnie Wright Blogg, *Johns Hopk. Hosp. Bull.*, 1919, 30: 219-233. Also, revised and enlarged with index, Lord Baltimore Press, Baltimore, 1921, p. 96.
22. Sir William Osler Memorial Volume of the International Association of Medical Museums (Bulletin No. IX). Edited by Maude E. Abbott, Murray Printing Co., Toronto, 1926, pp. 473-607.
23. Classified and Annotated Bibliography of Sir William Osler's Publications. Edited by Maude E. Abbott, B.A., M.D., LL.D., Revised and Indexed. The Medical Museum, McGill University, Montreal, 1939, 163 pp.

PNEUMONOKONIOSIS.—The inhalation of most types of dust, aside from silica and asbestos, cause little irritation and no significant harmful effects, Leroy U. Gardner, M.D., Saranac Lake, N.Y., points out in *The Journal of the American Medical Association* for February 17, 1940, in a discussion of the lung reactions to inhaled dust, particularly among industrial workers. While silica and asbestos dusts actually cause harmful structural changes by hardening the lung tissue, other mineral dusts, such as coal or iron, by themselves cause no significant hardening but merely pigmentation, which has no influence on the function of the lungs. When they are mixed with free silica there may be a degree of hardening, but it is due to the contaminating silica. As far as can be learned from statistical and experimental evidence, dusts other than free silica are not responsible for alteration of natural susceptibility to tuberculous or other types of infection. In some of the dusty trades, investigation is disclosing that other factors than the dust are responsible for lung infection. The infection may develop as a result of reactivation of a pre-existing latent tuberculous focus, but opinion today is unanimous that new infections from without are a more common cause. A contact with the tubercle bacillus, which in normal subjects would perhaps be quite harmless, is apt, in the silicotic lung, to result in chronic progressive infection. Regarding the probable effect that silicosis may have on disease of the heart or cancer of the lung, it is the author's opinion that it has little, if any, influence.

Association Notes

THE SEVENTY-FIRST ANNUAL MEETING OF THE CANADIAN MEDICAL ASSOCIATION, IN CONJUNCTION WITH THE SIXTIETH ANNUAL MEETING OF THE ONTARIO DIVISION, TO BE HELD IN TORONTO, JUNE 17, 18, 19, 20 and 21, 1940

Convention Headquarters, Royal York Hotel

The Canadian Medical Association

President, F. S. PATCH, Montreal;
President-elect, DUNCAN GRAHAM, Toronto;
General Secretary, T. C. ROUTLEY, Toronto.

Excellent progress is being made in preparing for the annual meeting to be held in Toronto during the week of June 17th next. The Central Program Committee, under the Chairmanship of Dr. Duncan Graham, has been meeting regularly for the past several months.

General Council will meet all day Monday and Tuesday morning, leaving Tuesday afternoon free for the meeting of the Council of the Ontario Division.

The third annual Medical Secretaries' Conference will be held on Monday evening.

Members of General Council are to be dinner guests of the Academy of Medicine, Toronto, on Tuesday night.

Round-Table Conferences will be held on the mornings of Wednesday, Thursday and Friday, from nine to ten o'clock.

General Sessions from 10.15 a.m. to 12.00 noon.

Sectional Meetings on the afternoons of these three days.

The Annual General Meeting will be held on Wednesday night.

Thursday night will be given over to the Committee on Medical Economics. Following dinner, the program will be in charge of Dr. Wallace Wilson, of Vancouver.

A change has been effected this year in moving the Golf Tournament from Friday to Tuesday.

The Royal York Hotel, Toronto, has been most generous with its space. It would now appear that splendid accommodation will be available for all our requirements.

Hereunder follows a list of speakers with their subjects, as arranged up to February 23rd.

The Ontario Division

President, W. A. JONES, Kingston;
President-elect, A. B. WHYTOCK, Niagara Falls;
Secretary, A. D. KELLY, Toronto.

GENERAL SESSIONS

Dr. J. D. Adamson, Winnipeg
The clinical significance of bronchial obstruction.

Dr. J. H. Couch, Toronto
Treatment of injuries and infections of the hand.

Dr. Alan Curry, Halifax
Intestinal obstruction.

Dr. E. P. Fowler, Jr., New York
The course and prognosis of otitis media under new and old methods of treatment.

Dr. J. Gardner Hopkins, New York
Urticaria.

Dr. Fulton Gillespie, Edmonton
Acute abdominal pain.

Dr. J. C. Meakins, Montreal
Shock; its recognition and treatment.

Dr. J. H. Means, Boston
The diagnosis and treatment of hyperthyroidism.

Dr. Gavin Miller, Montreal
(Subject to be announced).

Section of Anæsthesia

Dr. W. E. Brown, and
Professor G. H. W. Lucas, Toronto
Observations on ethyl-normal-propyl ether.

Dr. Simon Dworkin, Montreal
Conditioned reflexes and anæsthesia.

Dr. Digby Leigh, Montreal
Respiration during anæsthesia.

Dr. Rice Meredith, Toronto
Combined nupercain spinal and cyclopropane anæsthesia.

Dr. H. E. Pugsley, Gravenhurst
Anæsthesia in the patient with pulmonary tuberculosis.

Section of Anæsthesia—*Continued*

Discussion of unusual reactions occurring during anæsthesia—case reports
Drs. D. C. Aikenhead, Winnipeg; Ellen Blatchford, Toronto; Clayton G. Bryan, Toronto; J. H. Burgess, Ottawa; John Chassels, Toronto; Robert Ferguson, Montreal; E. W. Lunney, Saint John; Karl E. Hollis, Toronto.

Section of Dermatology

Dr. W. G. Brock, Winnipeg
Fungus infections.

Dr. J. F. Burgess, Montreal
Lichen planus.

Dr. L. P. Ereaux, Montreal
Acneform eruptions.

Dr. S. E. Grimes, Ottawa
Eczema.

Dr. W. R. Jaffrey, Hamilton
Dermatological neuroses.

Dr. Albéric Marin, Montreal
Treatment of lues of the nervous system by artificial fever.

Section of Historical Medicine

Dr. J. H. Couch, Toronto
(Subject to be announced).

Dr. T. G. H. Drake, Toronto
Postage stamps of medical and pædiatric interest.

Dr. Thos. Gibson, Kingston
The iconography of Theodore Turquet de Mayerne—engravings and portraits.

Dr. W. L. Holman, Toronto
The Klotz Library.

Dr. Heber Jamieson, Edmonton
A doctour of physik.

Dr. A. G. Nicholls, Montreal
Natural philosophy during the reign of King Charles II.

Dr. Léo Pariseau, Montreal
Military medicine; long ago, yesteryear, and tomorrow.

Dr. E. P. Scarlett, Calgary
Shakespeare's son-in-law, Dr. John Hall.

Dr. M. W. Thomas, Vancouver
(Subject to be announced).

Section of Medicine

Dr. E. A. Bartram, London
Pulmonary artery thrombosis.

Dr. Lennox Bell, Winnipeg
The management of obesity.

Dr. W. Hurst Brown, Toronto
Treatment of infection with the newer drugs.

Dr. Lillian Chase, Regina
Diabetes mellitus: Problems of its control.

Dr. R. E. Cleghorn, Toronto
Recognition and treatment of Addison's disease.

Medicine—*Continued.*

Dr. Jos. Daly, Toronto
Diets in dyspepsia.

Dr. Guy H. Fisk, Montreal
The value of remedial exercises in treatment.

Dr. W. J. Gardiner, Toronto
The use of apparatus in physiotherapy.

Dr. A. H. Gordon, Montreal
The complaining patient.

Dr. F. Carlyle Hamilton, Toronto
The significance of gallop rhythm.

Dr. A. T. Henderson, Montreal
Practical aspects of allergy.

Dr. John Hepburn, Toronto
Diuretics in treatment of cardiac disease.

Dr. D. Sclater Lewis, Montreal
Clinical importance and treatment of pylorospasm.

Dr. J. W. McCutcheon, Hamilton
Acromegaly—case report.

Dr. Ian Macdonald, Toronto
Complications of pernicious anæmia.

Dr. Donald McEachern, Montreal
Epilepsy.

Dr. A. L. MacKinnon, Guelph
The psychoneuroses.

Dr. R. S. Stevens, Ottawa
Angina pectoris.

Section of Obstetrics and Gynæcology

Dr. L. T. Armstrong, Toronto
Abortion.

Dr. A. D. Campbell, Montreal
Hysterectomy—vaginal and abdominal.

Dr. W. G. Cosbie, Toronto
Pitfalls in gynæcological diagnosis.

Dr. J. H. Ebbs, Toronto
The influence of pre-natal feeding on the mother and child.

Dr. J. R. Fraser, Montreal
The essentials in technique during labour.

Dr. N. D. Frawley, Toronto
The treatment of disproportion.

Dr. Léon Gérin-Lajoie, Montreal
Utero-salpingography.

Dr. J. R. Goodall, Montreal
Some unusual and interesting clinical and pathological features of endometriosis.

Dr. J. C. Goodwin, Toronto
Gonococcal pelvic inflammation.

Dr. D. N. Henderson, Toronto
Granulosa cell tumours of the ovary.

Dr. H. W. Johnston, Toronto
Treatment of malignant diseases of the external genitalia in the female.

Dr. Stephen Langevin, Montreal
The occiput posterior.

Obstetrics and Gynæcology—*Continued.*

Dr. D. M. Low, Toronto
Cæsarean section: fifteen years' experience on a public ward service.

Dr. Edwin Robertson, Kingston
Gynæcological disorders of puberty.

Dr. Leslie Watt, Toronto
Treatment of non-malignant cervical lesions.

Section of Ophthalmology

Dr. W. L. Crewson, Hamilton
Ophthalmic allergy.

Dr. J. F. A. Johnston, Toronto
Sulphanilamide in ophthalmology.

Dr. T. H. Hodgson, Toronto
The normal and pathological vitreous humour.

Dr. R. G. C. Kelly, Toronto
Tuberculin as a therapeutic measure in ophthalmology.

Dr. A. Lloyd Morgan, Toronto
Plastic surgery of the eye-lids.

Dr. P. B. Macfarlane, Hamilton
Iridocyclitis with secondary glaucoma.

Dr. S. H. McKee, Montreal
Malignant melanoma of uveal tract—a review of 37 cases.

Dr. J. A. MacMillan, Montreal
Prevention and cure of lachrymation.

Dr. Gordon White, Toronto
The retina in diabetes.

Dr. W. W. Wright, Toronto
Fascia lata suture in ptosis.

Section of Otolaryngology

Dr. David H. Ballon, Montreal
Stricture of the œsophagus.

Dr. Edmund P. Fowler, Jr., New York
Critique of surgical cures for deafness.

Dr. G. E. Hodge, Montreal
The use of the sound-proof room in the testing of hearing.

Dr. P. E. Ireland, Toronto
Syphilis of the nose and throat.

Dr. W. J. McNally, Montreal
Deafness and the endocrines.

Dr. J. A. Sullivan, Toronto
Studies of section of the facial nerve in monkeys.

INSTRUCTIONAL COURSES

Dr. P. E. Ireland, Toronto
Pathology of the ear.

Dr. Gregor McGregor, Toronto
Pathology of the nose and throat.

Symposium on atrophic rhinitis and ozæna
Dr. Angus McLeod, Toronto;
Dr. J. Grant Strachan, Toronto;
Dr. R. P. Wright, Montreal.

Section of Pædiatrics

Dr. F. H. Boone, Hamilton
Sucking habits and deformities of dental arches.

Dr. Ernest Couture, Ottawa
School health problems and their relation to pædiatrics.

Dr. Alton Goldbloom, Montreal
Problems of the adolescent child.

Dr. J. D. Keith, Toronto
Prognosis of rheumatic heart disease.

Dr. L. M. Lindsay, Montreal
Treatment of the overweight child.

Dr. E. A. Morgan, Toronto
The present status of the thymus gland in pædiatric practice.

Dr. K. L. McAlpine, London
Management of the anæmias of infancy.

Dr. H. H. McGarry, Niagara Falls
Hypoparathyroidism in childhood.

Dr. R. R. MacGregor, Kingston
Sulfanilamide in the treatment of acute laryngo-tracheo bronchitis.

Dr. C. E. Snelling, Toronto
Technique in establishing the diagnosis of genito-urinary malformations.

Dr. F. F. Tisdall, Toronto
Vitamin therapy and its importance in the present day nutrition of childhood.

Section of Radiology

Symposium on radiological examination of the gall bladder.
Dr. E. A. Petrie, Saint John
An analysis of technique of radiological examination of the gall bladder.
Dr. M. R. Hall, Toronto
Correlation of clinical and radiological findings.

Radiology—*Continued.*

Symposium on radiological examination of accessory nasal sinuses.

Dr. Carleton B. Peirce, Montreal
Anatomy from the radiological viewpoint, lymphatic drainage, etc.

Dr. E. M. Crawford, Montreal and
Dr. H. S. Wismer, London
Correlation of clinical and radiological findings.

Symposium on radiological aspects of cancer of the breast.

Dr. A. D. Irvine, Edmonton
Dr. B. R. Mooney, Winnipeg
Dr. Leo Payeur, Quebec
Post-operative roentgenotherapy in cancer of the breast.

Dr. Jules Gosselin, Quebec
The use of the seriescope in diagnosis, illustrated by movie film.

Dr. P. M. Andrus, London
The determination of cardiac enlargement from inspiratory chest films.

Section of Rheumatic Diseases

Symposium dealing with disorders of the vertebral column and back pain.

Dr. W. L. Donohue, Toronto
Pathology.

Dr. A. A. Fletcher, Toronto
Differential diagnosis.

Dr. Wallace Graham, Toronto
Spondylitis and degenerative lesions of the spine.

Prof. J. C. B. Grant, Toronto
Structure in relation to function.

Dr. W. J. Gardiner, Toronto
Physiotherapy posture manipulative measures.

Section of Surgery

Dr. H. G. Armstrong, Toronto
Surgical treatment of goitre.

Dr. Edmond Dubé, Montreal
Empyæma in children.

Dr. Alexander Gibson, Winnipeg
Treatment of fractures of the forearm.

Dr. W. L. Graham, Vancouver
Regional ileitis.

Dr. Fraser Gurd, Montreal
Water-balance in surgery.

Dr. R. I. Harris, Toronto
Peripheral vascular disease.

Dr. H. R. Inksater, Calgary
Investigation and treatment of injuries about the knee joint.

Surgery—*Continued.*

Dr. R. M. Janes, Toronto
Excision of tumours of the parotid gland with preliminary exposure of the facial nerve.

Dr. R. A. Johnston, London
Surgical conditions in diabetes.

Dr. W. S. Keith, and
Dr. W. C. Kruger, Toronto
Low back and sciatic pain caused by lesions of the intervertebral discs and ligaments.

Dr. F. I. Lewis, Toronto
The management of compound fractures.

Dr. M. R. MacCharles, Winnipeg
Carcinoma of the breast.

Dr. D. E. Robertson, Toronto
Decompression in small bowel obstruction.

Dr. Ross Robertson, Gravenhurst
Indications for operative therapy in pulmonary tuberculosis.

Dr. C. C. Ross, London
Investigation and treatment of painful feet.

Dr. Geo. H. Stobie, Belleville
Surgical pitfalls in the upper abdomen.

Dr. Harold Wookey, Toronto
Carcinoma of the œsophagus.

Section of Urology

Dr. Eldon E. Busby, London
The management of urinary infections.

Dr. Allan B. Hawthorne, Montreal
Congenital anomalies as the underlying cause of persistent urinary infection.

Dr. Walter P. Hogarth, Fort William
Pyelitis of pregnancy.

Dr. Wm. Hutchinson, Ottawa
Treatment of vesico-vaginal fistula.

Dr. Oscar Mercier, Montreal
Congenital ectopic pelvic kidney.

Dr. J. E. Nichol, Toronto
Indications for decapsulation of the kidney.

Dr. F. S. Patch,
Dr. L. J. Rhea, and
Dr. J. T. Codnere, Montreal
Hypertension in a girl of twelve; associated with unilateral, chronic, atrophic pyelonephritis; treated by nephrectomy.

Dr. Ralph Powell, Montreal
Obstructions at the vesical neck.

Dr. G. S. Foulds, and
Dr. W. J. Reid, Toronto
Rupture of the kidney.

Urology—*Continued.*

Dr. N. W. Roome, London
Retroperitoneal pneumography: further results.

Dr. Magnus I. Seng, Montreal
Urinary incontinence in women.

Dr. Karl Sternbach, and
Dr. Ross H. Flett, Toronto
A preliminary report on the experimental and clinical effects on the solution of urinary tract calculi by cactazona.

Dr. S. A. Wallace, Kamloops
Differential diagnosis of urological conditions from abdominal lesions.

Round-table conference—hydronephrosis
Dr. Robin Pearse, Toronto.

Round-table conference—sterility in the male
Dr. Emerson Smith, Montreal.

ROUND-TABLE CONFERENCES SUBJECTS AND CHAIRMEN

Dermatology

Mucous membrane lesions
Dr. E. J. Trow, Toronto.

Medicine

WEDNESDAY, JUNE 19TH

Diabetic complications
Dr. A. A. Fletcher, Toronto.

THURSDAY, JUNE 20TH

What are the dangers in the use of sulphanilamide and allied drugs?
Dr. E. A. Broughton, Toronto.

FRIDAY, JUNE 21ST

What is hypertension?
Dr. John Oille, Toronto.

Obstetrics and Gynæcology

WEDNESDAY, JUNE 19TH

Labour delayed in the first stage
Dr. R. W. Wesley, Toronto.

THURSDAY, JUNE 20TH

The therapeutic use of endocrine preparations in gynæcology
Dr. N. D. Frawley, Toronto.

FRIDAY, JUNE 21ST

Repair of birth injuries
Dr. W. G. Cosbie, Toronto.

Ophthalmology

WEDNESDAY, JUNE 19TH

Modern presbyopic corrections
Dr. W. H. Lowry, Toronto.

Ophthalmology—*Continued.*

THURSDAY, JUNE 20TH

(Combined with Otolaryngology).

Headache
Dr. Angus Campbell, Toronto.

FRIDAY, JUNE 21ST

Lesions of the macula
Dr. C. E. Hill, Toronto.

Otolaryngology

THURSDAY, JUNE 20TH

(In conjunction with Ophthalmology).

Headache
Dr. Angus Campbell, Toronto.

FRIDAY, JUNE 21ST

Cough and hoarseness
Dr. A. H. Veitch, Toronto;
Dr. G. E. Hodge, Montreal, and
Dr. S. L. Alexander, Toronto.

INSTRUCTIONAL COURSES

WEDNESDAY AND THURSDAY

Allergy in relation to the ear, nose and throat
Dr. A. T. Henderson, Montreal.

Diagnosis and present treatment of sinus disease
Dr. Perry Goldsmith, Toronto.

WEDNESDAY AND FRIDAY

Technique of mastoid surgery
Dr. J. A. Sullivan, Toronto.

Conservative and radical treatment of chronic otorrhœa
Dr. J. T. Rogers, Montreal.

Pædiatrics

WEDNESDAY, JUNE 19TH

Breast-feeding and feeding in the newborn period
Dr. C. E. Snelling, Toronto.

THURSDAY, JUNE 20TH

Immunization in childhood
Dr. Nelles Silverthorne, Toronto.

FRIDAY, JUNE 21ST

Common behaviour problems in infancy and childhood
Dr. William A. Hawke, Toronto.

Surgery

WEDNESDAY, JUNE 19TH

Empyæma
Dr. Robert M. Janes, Toronto.

THURSDAY, JUNE 20TH

Hæmatemesis
Dr. N. S. Shenstone, Toronto.

FRIDAY, JUNE 21ST

The management of fractures
Dr. R. I. Harris, Toronto.

Canadian Medical Advisory Committee

THE WAR

Your Canadian Medical Advisory Committee has held four meetings since its appointment at the September meeting of the Executive Committee. Complete details of the activities of the Committee have been sent regularly to each member of the Executive Committee, with a summary of activities appearing in the *Journal* from month to month. Employing the language of the British High Command, we may say that, at the moment, there is little to report.

It would appear that the Questionnaire Survey is now about as complete as we can hope to make it, with 8,610 cards received at this office. The cards have been coded and the relevant information transferred to the punch card system. A number of requests from headquarters and from military districts for information to be derived from the cards have been received and answered. The system works so smoothly that, within six hours of the receipt of a request for information dealing with several hundred names, the information was in print and on its way to the contact man who asked for it.

Dr. Duncan Graham has been appointed, on a part-time basis, Consultant in Medicine at Headquarters. This will not interfere with Dr. Graham's duties in the Canadian Medical Association or as a member of the Canadian Medical Advisory Committee.

RADIO

With two interruptions (because the CBC required our time for overseas broadcasts) our radio program has been proceeding since Wednesday, November 22nd. We have received very few comments from members of the profession with respect to the broadcasts, but those which have come to hand have been complimentary.

A report just received from the CBC indicates that the requests for copies of the talks pyramided from 9 for the first talk to 603 for the last one, which, by the way, was on the subject of overweight. Canada must be too fat! Four hundred of the 603 requests were for the members of a Service Club.

It has been agreed with the CBC to recess the series on April 24th, about which time Daylight Saving begins in some parts of Canada, the talks to be resumed on Wednesday, October 2nd.

CANCER

Our Department of Cancer Control is receiving reports fairly regularly from study groups in four provinces. Five provinces have as yet failed to send in any reports.

The Department of Health of the Province of Ontario has very kindly consented to assist us in studying, analyzing, and classifying the returns which are made, with their very active cancer division staffed by well trained personnel. This co-operation is welcomed and will be most helpful.

At the conclusion of a year in office, Dr. C. C. Ross, of London, retired from the Secretaryship of the Canadian Society for the Control of Cancer to resume practice in London. Mr. Don G. McMaster has been appointed to succeed Dr. Ross. Mr. McMaster, who comes from British Columbia, is the son of Mr. E. B. McMaster, of Vancouver, who has taken an active part in placing the British Columbia Branch of the Canadian Society for the Control of Cancer in the forefront of the movement in Canada.

NUTRITION

With the approval of the Executive Committee, the Association's Committee on Nutrition is proceeding in co-operation with the Canadian Life Insurance Officers' Association to prepare and make available for distribution in Canada 3,000,000 copies of a booklet on Nutrition which is calculated not only to give the housewife valuable information in a simple readable form, but also to increase the consumption of Canadian products. The Canadian Life Insurance Officers' Association has already voted $25,000 to the project. The contribution from the Canadian Medical Association consists in preparing the material, which involves no financial outlay.

INFORMATION TO INSURANCE COMPANIES

From time to time complaints have reached us from doctors who have been requested to furnish reports on patients to insurance companies. The doctors take the view, and very properly so, that they should not give a report on a patient to anybody without the written consent of the patient. This matter has been discussed with the Canadian Life Insurance Officers' Association. The General Secretary is now in a position to say that in future no such request will be made of a doctor in Canada until and unless written authority for the giving of such a report is signed by the person concerned. This arrangement should settle that difficulty. The question of who pays for the report remains between the doctor and the party or parties concerned.

T. C. ROUTLEY,
General Secretary.

Hospital Service Department Notes

V.A.D. Courses in Canada Not Recommended for the Present

At a recent conference of representatives of the Canadian Red Cross Society, the St. John Ambulance Association, the Canadian Nurses Association, and the Canadian Hospital Council, it was recommended that provision for hospital or advanced training for V.A.D. work be not undertaken for the present.

Because V.A.D.s were widely used towards the close of the last war the impression has been created that there is a need or opening overseas in hospitals for Canadian V.A.D.s at the present time. The V.A.D. Council of the Joint Committee of the British Red Cross and the St. John Emergency Committee has reported that there is no need for Canadian V.A.D.s over there. British V.A.D.s are working in other than hospital assignments in the present war. Nor is there any indication of an early need for V.A.D.s in Canada. Hence the above resolution.

Realizing, however, that severe losses might necessitate the use of volunteer forces in hospitals, it was arranged that a subcommittee representing the Canadian Nurses Association, the Canadian Red Cross, the St. John Ambulance Association and the Department of National Defence should work out a syllabus for such training, which would be readily available should circumstances warrant its use.

This decision, discouraging the hasty setting up of V.A.D. courses in hospitals, was not intended to discourage the taking of courses in First Aid and in Home Nursing. These courses given by the St. John Ambulance Association are preliminary to the advanced V.A.D. work and are of real value to those taking the certificates, irrespective of the possibility of V.A.D. work in the future.

All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, 184 College Street, Toronto.

Medical Societies

The Academy of Medicine, Toronto

The Academy of Medicine, Toronto, held its annual Library and Historical Night on January 9, 1940, which was attended by approximately two hundred Fellows and guests. Dr. Maude E. Abbott, former Assistant Professor of Medicine and Curator of the Museum of the History of Medicine, McGill University, delivered an address in connection with the presentation of the portrait of Dr. Helen MacMurchy, C.B.E., from the brush of Miss Marion Long, R.C.A., O.S.A. Following the address, Dr. Edna M. Guest, O.B.E., President of the Federation of the Medical Women of Canada, presented the portrait to Dr. MacMurchy who expressed her appreciation of the great honour paid her. Dr. MacMurchy, in accepting it, paid tribute to the many splendid teachers in medicine who had given her inspiration and encouragement in her career. She then presented the portrait to the Academy. The President, Dr. D. E. Robertson, in acknowledging the gift, said the Fellows of the Academy joined with the Federation of Medical Women of Canada in paying honour to one whose career was an inspiration to all Canadians who study medicine.

Dr. J. Harry Ebbs showed coloured slides taken while on an aeroplane trip to the western Arctic in the summer of 1939, giving a running commentary upon the places visited, together with incidents of the trip. Dr. Charles H. M. Williams followed with a description of his trip by boat to the eastern Arctic, which was illustrated by moving pictures taken at that time. Both Drs. Ebbs and Williams were making investigation into the nutrition of the Eskimos in the interest of medicine and dentistry.

Dr. R. I. Harris, Chairman of the Library Committee, gave a brief talk on recent accessions to the library, especially on the anatomical texts from the library of the late Prof. J. P. McMurrich. He also paid tribute to the late Dr. John Ferguson who had given so many years of service to the Library Committee and had been a generous benefactor.

Dr. E. A. McCulloch, Chairman of the Museum Committee, gave a short description of some interesting old instruments which had been presented to the museum. He was followed by Mr. K. W. Burke who gave a short address on the subject of medical postage stamps.

E. W. MITCHELL,
Honorary Secretary.

The Calgary Medical Society

On December 12, 1939, Dr. John Scott, of the University of Alberta, gave a most interesting address to the members of the Calgary Medical Society on "Hæmorrhagic Diseases".

On January 9, 1940, the members of the Calgary Medical Society listened to a symposium on fractures. Dr. D. S. Macnab discussed "General Principles in the Treatment of Fractures" including early reduction, early and frequent x-ray examinations, relaxation by local or general anæsthesia, skeletal traction and its value in treating fractures of long bones, especially the femur.

Dr. A. I. Danks discussed fractures of the skull and, after reviewing certain anatomical facts, classified the types of fracture into (1) punctured, or indented; (2) bursting, or radiating.

About 15 per cent of all factures admitted to hospital are fractures of the skull. The mortal-

ity is 15 to 50 per cent in adults, while in children it is only 2.5 to 3.5 per cent. Careful general, as well as particular examination, should be made of the patient. Lumbar puncture is not necessary for diagnosis. He outlined points in differential diagnosis including post-traumatic concussion and the post-traumatic psychoneurotic state (hysteria).

Dr. R. G. Townsend's contribution to the symposium was on "Surgical Lesions of the Acromioclavicular Joint and Fractures of the Clavicle". He stated that fractures of the clavicle as a class were not of a glamorous type, as bony union and restoration of function were the rule. He reviewed the anatomy of the shoulder-joint region. In treating these fractures there were common pitfalls which should be avoided. He considered the Böhler and Rodger Anderson methods of treatment gave generally good results.

Dr. H. V. Morgan's subject was "Treatment of Fractures of both bones of the Forearm". He likewise reviewed salient anatomical facts and the part played in this class of fractures by the biceps, the supinator brevis, the pronator radii teres muscles and the interosseous membrane. He discussed the mechanics of the incomplete and complete types of fracture, the clinical signs and symptoms and methods of treating this difficult class of fractures.

G. E. LEARMONTH

The Canadian Ophthalmological Society

The second annual meeting of the Canadian Ophthalmological Society was held in Kingston, Ont., on November 18, 1939. The President, Dr. W. Gordon M. Byers, occupied the chair, and 33 members and 7 guests were present.

The morning session was devoted first to the presentation of a series of clinical cases by Dr. H. P. Folger, and following this, Dr. E. V. L. Brown, Chicago, President of the American Ophthalmological Society, read a paper entitled "Retroretinal tissue from the choroid in Kuhnt-Junius degeneration of the macula (anatomical study)". Dr. Brown's paper, illustrated by beautiful lantern slides, was not only a notable contribution to our knowledge of a rare condition but a model of how a pathological examination of the eyeball should be carried out.

At the luncheon Col. E. A. Baker, Toronto, spoke on "Ophthalmic problems of war", his address being introductory to a round-table discussion on "The ophthalmic problems of the present war" that constituted the main feature of the afternoon session. This discussion was rendered specially valuable by reason of the fact that a relatively large number of those taking part had served in the last great war. Lt.-Col. J. E. Hunter, Staff Officer Medical Services (Air) at National Defence Headquarters, Ottawa, and Col. E. A. Baker, Managing Director of the Canadian National Institute for the Blind, were present by invitation. Virtually every phase of ophthalmic war work was covered, but some points about which there seemed to be unanimity of opinion were as follows.

Visual standards for the army are unnecessarily high. Men who are rejected for slightly defective vision at a time when they are keen to enlist are discouraged, and may well be lost as far as future military service is concerned. It seems a pity to demand 6/9 vision, or better, for store men, cooks, carpenters, batmen, and sanitary men, when during the last war we carried many visual defectives who were key men in their battalions. The acceptance of 20 per cent "B" men with minor defects for every branch of the army was thought to be highly desirable. Men of this class are badly needed in the Air Force and in every mechanical division. It may mean at times that if we do not accept these men they will be certified as having 6/6 vision, and the country will pay eventually for visual loss. One of the members thought that 6/12 vision was sufficient for any army purpose, while another found that 20 per cent of the men had been rejected for the flying service, only the very cream of the country being taken. It was felt that the military authorities should reconsider the whole question of visual standards in co-operation with representatives from the Canadian Ophthalmological Society, and that in recording vision the metric system, as used by the British Army, should be followed by the Canadian Army.

The problem of glasses seems to be urgent. They should never be supplied gratuitously, for during the last war they were more or less forced upon a man and discarded by him as soon as he got back to his barracks and tried them on. A man should be called upon to pay the wholesale army price for his glasses, and he would be glad to do so if he were accepted as Category "A" with a stated visual defect on his attestation paper.

A larger number of eye surgeons ought to be attached to casualty clearing stations. Time is of the essence of things in the treatment of wounds and injuries of the eye, and skilful surgery at the outset would lessen the need for plastic operations at a later date. Moreover fewer eye casualties would be referred to base hospitals if ophthalmologists were available. Eye surgeons should not be drafted to other branches of the service in view of the urgent need for them at the front. General practitioners, nurses, and hospital orderlies who are to be attached to casualty stations should receive special training in eye work from qualified teachers before leaving Canada.

It was felt that the lists of ophthalmic instruments and apparatus could be bettered in several ways in the interests of efficiency and economy. Also, that all instruments and apparatus should

be approved of by qualified oculists before purchase.

The final contribution by Dr. Colin Campbell on "Experience in base hospitals" was followed with interest. He stated that in the last war no standard forms had been provided to keep records, so they had to be obtained locally and paid for from the Canteen Fund. Surgical instruments for eye work were not ordered until 1918; then they came from a druggist, and consisted for the most part of museum pieces. Eserin had been ordered for a case of acute glaucoma, but it arrived some months later when the eye had been excised. Much trouble was occasioned by defective records of vision, and frequently the soldier's history was greatly delayed following his admission to hospital. Records while the patient is in hospital should be carefully kept. Many were lost in the last war that would now be useful to the Pension Board. Special equipment for testing malingerers should be available. Many men unfit for service owing to eye defects were taken overseas where it was impossible to use them, and they had to be returned at great expense, to be on the pension list for the rest of their lives. Such inefficiency should be guarded against. Dr. Campbell stated that much refraction and time-consuming treatment of functional cases had been required, and even operations for squint were numerous. Base hospitals should have both the giant and small magnets with a localizer.

At the Business Session the Committee on Visual Standards in Canada reported that their work had been completed, and that its report, when published, would serve as an expression of the considered opinion of the Canadian Ophthalmological Society in regard to what standards of vision in Canada should be.

A resolution of condolence was passed, standing, by the Society on the death of Dr. C. E. O'Connor, who was to have been one of the hosts of the Society at its meeting in Kingston.

It was decided to hold the third Annual Meeting of the Canadian Ophthalmological Society in Ottawa, on October 19, 1940, and the following officers were elected: *President,* Dr. W. H. Lowry; *Vice-president,* Dr. J. Vaillancourt; *Secretary-Treasurer,* Dr. Alexander E. MacDonald; *Council*: Drs. F. T. Tooke, W. G. Fraser, R. B. Boucher, R. E. Mathers and H. P. Folger.

Honorary Membership was conferred upon Dr. E. V. L. Brown, the Society's guest of honour.

The earliest mention of ophthalmology occurs in a law book of Babylon-Assyria in 2250 B.C. Aristotle was the first comparative ophthalmologist. The first textbook on the eye which has come down to our day was written during the first half of the Eleventh Century in Bagdad. Leonardo da Vinci was the first to compare the action of the eye to a camera.—National Health Council.

Letters, Notes and Queries

Physiotherapy During the War and After

To the Editor:

The establishment of convalescent military hospitals in Canada would seem to be a logical "base line" war activity. Many convalescents require protracted orthopædic treatment to achieve even partial recovery. Adequate treatment of such cases depends in the first place upon the services of thoroughly trained personnel and, secondly, upon proper equipment for up-to-date orthopædics and physiotherapy.

To staff orthopædic centres it is to be presumed that there will be no lack of competent orthopædic surgeons and of nurses with the necessary qualifications or experience. It is also, however, absolutely necessary that there should be a sufficient number of expert physiotherapists, since the value of physiotherapy in the later treatment of orthopædic cases cannot be overestimated. To meet military requirements, over and above present civilian needs, the number of available physiotherapists in Canada is insufficient, and additional training facilities, such as are now found only at the University of Toronto, should be provided at once for training additional physiotherapists. It is suggested that women with previous training in physical education are the most suitable candidates, and that undue delay might result in such women becoming absorbed in other less vitally important work.

Up-to-date orthopædic centres should, of course, be provided with sufficient operating rooms, adequate equipment for x-ray work, diathermy and other lamp treatments. Buildings should be so laid out that sun porches will receive the maximum of direct sunlight in all seasons as well as shelter from winds. Each centre should include a medical gymnasium with apparatus for specialized treatments, so that each patient can receive the exercise best suited to his individual needs. A portion of this equipment might be built in the workshops which form part of each orthopædic centre for making those splints, braces, casts and other aids which must be fitted to the individual patient.

An essential part of any such orthopædic centre is equipment for hydrotherapy, facilities for which in Canadian hospitals are quite insufficient at the present time. The immense value of hydrotherapy in orthopædic cases has been proved beyond question. Hydrotherapy is notably successful in the treatment of both joint and nerve injuries (the latter, of course, including injuries to the brain and cord.) Immersion in warm or hot water induces relaxation, and in some cases reduces irritability. The

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Answers to letters appearing in this column should be sent to the Editor, 3640 University Street, Montreal.

buoyancy of the water supports both limbs and trunk as no purely mechanical appliance can. Thus hydrotherapy decreases the discomfort of necessary remedial exercise and by simultaneously reducing both the irritability and the effort involved enables weakened muscles and feeble nervous impulses to produce voluntary movements through much wider arcs than would be possible out of the water, even with good mechanical aids. Hydrotherapy thus shortens very considerably the time necessary for recovery of function, which, of course, means a marked reduction in the duration of hospitalization.

Suitable equipment for hydrotherapy includes continuous baths and a pool or pools of sufficient size and depth to allow every sort of exercise. Pools should be equipped with such simple apparatus as is necessary to assist underwater exercise and should be capable of a fairly wide range of temperature adjustment. An essential feature is adequate equipment for the movement of patients into and out of the pool with as little fatigue and discomfort as possible. This is most important, as unnecessary pain and nervous tension greatly reduce the value of the treatment.

While open wounds without bone involvement often benefit from hot baths, the ordinary continuous bath is to be preferred in such cases for sanitary reasons. In field general hospitals improvised continuous baths of stout planking lined with stainless steel can be constructed by engineer services, thus permitting early commencement of passive and voluntary movements, stimulating healing, securing early restoration of function, and avoiding contractures. Such equipment would also be of value for neurotic cases. In this connection may be noted the need of orderlies trained to move patients correctly and to co-operate with physiotherapists in charge of the treatments.

Further features of orthopædic centres which should on no account be overlooked are facilities both for occupational therapy and for vocational training. For those patients who recover completely the last is not a serious problem, but many, while reaching their greatest possible return of function, will nevertheless be left with some degree of disability. It is vitally important, for social and economic as well as humanitarian reasons, that such handicapped men be trained as fully as possible to readjust themselves to take useful places in society.

The value of orthopædic centres of this sort was convincingly demonstrated during the last war. What is now needed is the application of the experience gained there, plus all the benefits of the intervening twenty years of progress in treatment and technique.

Apart from the obvious humanitarian considerations, there are many practical advantages to such a plan. In the first place, many patients who would otherwise be left with a partial disability for life would secure a substantially complete restoration of function. Secondly, those who cannot make a complete recovery would nevertheless be discharged with a minimum of disability. In both cases the country would be saved large and avoidable expenditures for pensions. By combining with reasonable restoration of function the training necessary for its effective use patients would leave such hospitals prepared to re-enter the life of the community with courage and confidence. Such satisfactory adjustments are of immense value in preventing discontent and unrest during the inevitable reconstruction following the dislocation of war. Lastly, it is worth considering that the value of such orthopædic centres would extend far beyond their military service; for they would certainly find full use for civilian cases after the war need has passed, as there is in Canada a serious lack of such facilities. It is to be hoped that in the detailed plans for medical services referred to by the Minister of National Defence due consideration has been given to the provision of orthopædic centres.

Yours truly,

BEATRICE LYMAN JOHNSTON, M.A.

Montreal,
December 26, 1939.

[The above letter calls attention to certain considerations which are of particular importance at the present time. Mrs. Johnston writes with the conviction and zeal that only comes from sad personal experience, and for that reason, if for no other, her views are worthy of attention.—Ed.].

Abstracts from Current Literature

Surgery

Intussusception Due to Hæmangioma of the Jejunum. Marchant, F. T.: *Arch. Surg.*, 1939, **39**: 1040.

Benign tumours of the small intestine are of infrequent occurrence. Serious or even fatal complications may be associated with them. Among such tumours those of vascular origin are among the rarest. Brown has classified these into the following groups. (1) Multiple tumours of vascular arcades, forming nodules in the submucosa and associated with the arteries or veins. They form vascular nævi or cavernous hæmangiomas. (2) Submucosal tumours which grow toward the lumen of the intestine and may become ulcerated by pressure or trauma. (3) Submucosal tumours which may become polypoid in structure and grow to a size sufficient to obstruct the lumen or to bring about an intussusception. (4) Diffuse ring-like tumours which begin in the submucosa and involve the muscularis so that the lumen is constricted and an acute or chronic obstruction results.

The clinical signs of these vascular tumours are usually those of intestinal obstruction, hæmorrhage or acute inflammation. The author reports two histories of hæmangioma of the jejunum complicated by intussusception from the records of the Royal Victoria Hospital, Montreal. G. E. LEARMONTH

Correlation of Pathological and Clinical Observations in Chronic Lymphoid Appendicitis. Fausset, C. B.: *Arch. Surg.*, 1939, **39**: 576.

According to the author, a correlation seems to exist between the pathological diagnosis of a specific type of chronic appendicitis, namely, the chronic lymphoid, and a definite symptom-complex which he describes. The pathological changes consist of hyperplasia of the lymphoid elements and a variable degree of fibrosis and obliteration. The clinical picture is characterized by attacks of mild to moderately severe abdominal pain, with a high incidence of nausea and occasional associated episodes of vomiting, recurring over a period lasting from months to years and never being severe enough to fall into the category of acute appendicitis.

According to Beluff, there are three fundamental types; the hypertrophic, hyperplastic, sclerotic-atrophic and the obliterative. In the present study Fausset has reviewed a series of case records of chronic lymphoid appendicitis, 182 in number, at the New York Hospital. Symptoms were present for as long as ten years; vomiting occurred in 50 per cent; pain usually focused in the right lower quadrant of the abdomen; spasm of the abdominal muscles and rebound tenderness were rare; the temperature was normal, and the leucocyte count ranged between 5,000 and 15,000. G. E. LEARMONTH

The Rôle of Fascia in Myosynovitis and Adhesions. Gratz, C. M. and Meeker, L. H.: *Surg., Gyn. & Obst.*, 1939, **69**: 627.

Citing their previous work and that of Ober and Spurling there is elaboration of this hypothesis of "biomechanics". "Fascial planes function as joints synchronizing motion between muscles, groups of muscles, nerves and blood-vessels. Traumatic and inflammatory lesions may involve these planes, resulting in myosynovitis or fascial adhesions." These spaces are lined with synovial cells corresponding to those lining joints. Histologically, these lesions are shown by (1) altered secretions, which may be brought about by rupture of the fascial fibres and sometimes by the production of mucoid degeneration and polyps; (2) focal thickenings of the opposing fascial surface epithelium; in this change the hyperplasia of mesothelium may interfere with nerve and vessel function without evidence of inflammatory reaction, and in associated rheumatic diathesis hyperplasia of the ligamentum flava or tensor fasciæ latæ may be explained; (3) actual adhesions. In lymphatic elephantiasis the abnormal strain on fascia may produce extravasations of lymph, deposits of blood crystals and calcium. They describe a modified Kondoleon operation, using attached fascial living sutures with satisfactory clinical and cosmetic results.

Massage and manipulation with heat may free agglutinated fascial surfaces, release secretions and thin-out or break adhesions. A plea is made for further co-operation between students of clinical surgery, pathology and "biomechanics". FRANK DORRANCE

Obstetrics and Gynæcology

Post-partum Hæmorrhage with Special Reference to Partial Detachment of the Placenta. Corbet, R. M.: *Brit. M. J.*, 1939, **2**: 438.

The paper deals with the mechanism of separation of the placenta, suggesting that the Schultz method rather than the Matthews Duncan is the normal one.

Post-partum hæmorrhage is divided into three classes: (1) placental site hæmorrhage; (2) true atonic hæmorrhage, where there is no bleeding till after delivery of the placenta; (3) traumatic hæmorrhage, where the bleeding comes from lacerations in some part of the birth canal.

Premature separation of the placenta may be held to be the cause of the first type of hæmorrhage. Causes of the separation are discussed, and signs and symptoms described.

Treatment of this type of hæmorrhage is considered, particularly with regard to the manual removal of the placenta and packing of the uterus.

The other two types of hæmorrhage are dealt with briefly, but attention is called to the difficulty which sometimes arises in the diagnosis of traumatic hæmorrhage.

Some suggestions are made for lowering the mortality from this condition. ROSS MITCHELL

Puerperal Agranulocytosis following Sulfanilamide Treatment. Gayus, I. K., Green-Armytage, V. B. and Baker, J. K.: *Brit. M. J.*, 1939, **2**: 560.

A fatal case of agranulocytosis occurring in a primipara of 24 is recorded. A swab taken from the vagina showed hæmolytic streptococci, Grade A. The patient received 39.5 grams of sulfanilamide over a period of seventeen days. Twenty-eight days after delivery she developed an agranulocytic angina and she was transferred to Queen Charlotte's isolation block. The blood film showed hæmoglobin 67 per cent, leucocytes 850 per c.mm. (lymphocytes 90 per cent, monocytes 10 per cent, no polymorphonuclears seen in 150 white cells). In spite of the administration of pentnucleotide and a continuous-drip blood transfusion she became worse and died thirty-eight hours after admission. Despite the wide use of sulfanilamide, the authors believe that there is a definite risk of agranulocytosis which cannot and must not be disre-

garded. To obviate disaster it is imperative that a complete blood count should be done, without waiting for symptoms, after 25 grams of sulfanilamide have been exhibited. ROSS MITCHELL

The Factor of Anæsthesia in the Pathogenesis of Asphyxia Neonatorum. Rosenfeld, M. and Synder, F. S.: *Am. J. Obst. & Gyn.*, 1939, **38**: 424.

The problem of obstetric anæsthesia has been approached by a new method, based upon the direct observation of intrauterine respiratory movements in animals. Most anæsthetics of both non-volatile and volatile type suppress intrauterine respiration long before surgical anæsthesia is reached in the mother. The result with cyclopropane illustrates the attainment of one important objective of obstetric anæsthesia, namely, the production of full surgical anæsthesia of the mother without interruption of the fetal respiration. Because of the peculiar sensitivity of the fetal respiratory system to depression by anæsthetics the factor of anæsthesia must be regarded as an important one in the pathogenesis of respiratory failure at birth.

ROSS MITCHELL

Ophthalmology

Anisoikonia. Berens, C.: *Am. J. Ophth.*, 1939, **22**: 625.

The term "anisoikonia" is derived from two Greek words meaning "unequal" and "image", and was used by Ames at the suggestion of Lancaster to describe that condition of the eyes in which there is a difference in the size or shape of ocular images (retinal images as interpreted by their corresponding brain centres).

Anisoikonia is of two principle types—(1) overall difference, in which one image is larger than the other in all meridians; and (2) meridional difference, in which one image is larger than the other in one meridian. Combinations of the two forms may also occur. If ocular images are markedly unequal in size or shape there may be a disturbance of binocular vision which may or may not be apparent to the patient. However, because the effects may become manifest through the nervous system the condition has significance not only for the ophthalmologist but also for the neurologist and the general physician.

The symptoms complained of by patients consisted of visual disturbances (blurred vision, diplopia, fixation difficulty, and squint), ocular discomfort, photophobia, headache, and general symptoms referable to the gastro-intestinal tract and nervous system. Indefinite symptoms of ocular discomfort aggravated by reading and viewing motion pictures and driving automobiles were common complaints. The majority suffered ocular discomfort and headaches, especially while reading. The causes of anisoikonia may be optical, anatomical or neuropsychological. For testing purposes the ophthalmo-eikonometer is used, and the condition corrected by the wearing of isoikonic lenses. S. HANFORD MCKEE

Neurology and Psychiatry

Remissions in Multiple Sclerosis. Brown, M. R. and Putnam, T. J.: *Arch. Neurol. & Psychiat.*, 1939, **41**: 913.

Few thorough studies of that bizarre phenomenon, the tendency to remissions in multiple sclerosis, are extant. The present article is a worthwhile addition. The writers criticize the too prevalent view that multiple sclerosis is the wastebasket of neurology, into which the too often baffled specialist places many of his diagnostic difficulties. In but one case was the diagnosis (of a competent neurologist) disproved at autopsy; while never was the condition found at autopsy without a diagnosis having been made during life.

Certain diagnostic difficulties were encountered. (1) Cases with a clinical picture of multiple sclerosis but with positive Wassermann blood or cerebrospinal fluid. There appeared no reason to exclude these in the absence of other specific findings in cerebrospinal fluid, especially when anti-syphilitic treatment produced no results. (2) Cases with spinal cord symptoms only, the cranial nerves remaining intact. Most puzzling of all are the not uncommon cases of subacute combined degeneration with normal blood picture and gastric acidity. A total of 133 cases was studied, covering 1,095 patient-years: 239 instances of improvement were reported by 92 patients. In only 41 was the disease uninterruptedly progressive or stationary after a single attack. In general, symptoms due to small lesions, *e.g.*, diplopia, restricted sensory change, etc., tend to regress. Large lesions producing such findings as parapelgia, ataxia or mental deterioration are usually permanent.

Isolated symptoms have much better prognosis than groups. Symptoms tend to become increasingly severe. Apparently most lesions of multiple sclerosis go through an acute stage, after which some fibres may regain function. In the larger lesions certainly, and to some extent in all, some or many fibres are permanently destroyed.

Such an analysis of cases has two benefits: (*a*) as a rough basis for prognosis; and (*b*) it may shed light on the "natural history" of the sclerotic plaque. G. N. PATERSON-SMYTH

The Mechanism of Fixed Dilatation of Pupil. Reid, W. L. and Cone, W. V.: *J. Am. M. Ass.*, 1939, **112**: 20.

From a study of 10 patients (8 at autopsy) and from 10 experiments on monkeys the writers present a clear and convincing explanation of this not uncommon phenomenon.

In all cases, clinical and experimental, there was herniation of the hippocampal gyrus over the free edge of the tentorium compressing the third (oculomotor) nerve against the greater wing of the sphenoid. The ensuing dilation and fixity of the ipsilateral pupil could only have one other possible explanation, namely, that it is due to the distortion of the midbrain so frequently accompanying such herniation. However, the work of Magoun *et al.* has shown indisputably that although bilateral pupillary constriction may be obtained from stimulation of the grey matter about the Sylvian aqueduct, ipsilateral constriction only occurred on infranuclear (peripheral) stimulation. Interesting the mechanism may be, but the real practical significance lies in the early recognition of unilateral third nerve involvement as a very grave prognostic sign in expanding intracranial lesions.

G. N. PATERSON-SMYTH

Therapeutics

The Treatment of Internal Carotid Aneurysms Within the Cavernous Sinus and the Cranial Chamber. Dandy, W. E.: *Ann. Surg.*, 1939, **109**: 689.

Herein are reported three cases of arterial aneurysms of the intracranial portion of the internal carotid artery. In each the aneurysm was alongside the carotid as it came through the cavernous sinus. Each was treated by ligating the internal carotid artery, both intracranially (with a clip) and in the neck (with a silk ligature). All are symptomatically well. Dandy feels that aneurysms should be more frequently exposed surgically, for in many instances of reputed cure, *e.g.*, after recovery from a subarachnoid hæmorrhage, the aneurysm is merely bleeding into a false sac behind a thrombotic wall which is slowly extending. He is reluctant to advise surgical treatment for aneurysms of the circle of Willis unless the subarachnoid hæmorrhages are sufficiently severe to endanger life and are known to recur. There is no doubt concerning the need for surgical intervention for aneurysms of the carotid producing oculomotor palsies and severe recurring pains. For those aneurysms of the internal carotid that are within the cranial chamber and below the main branches, or are within the carotid canal, two lines of attack may be used: (1) ligation of the internal carotid in the neck; and (2) ligation of the internal carotid within the cranial chamber and in the neck. One advantage of the method of trapping the aneurysm between two sutures is that if the intracranial approach is made first one can see the aneurysm and perhaps treat it by ligating the sac alone, without sacrificing the internal carotid artery. Further, unless arteriography has previously proved an aneurysm, the possibility of tumour can be ruled out.

FRANK TURNBULL

Anæmia in Myxœdema: and the Rôle of the Thyroid Gland in Erythropoiesis. Bomford, R.: *Quart. J. Med.*, 1938, **7**: 495.

From a hæmatological viewpoint the author divides the anæmias found in association with myxœdema into three types. Simple hyperchromic (the most frequent); hypochromic; and Addisonian.

It is concluded that the simple hyperchromic type is the uncomplicated anæmia of myxœdema, and that the hypochromic and Addisonian types, also found in association with myxœdema, are nothing more than alimentary iron and liver-deficiency anæmias modified by the co-existence of myxœdema.

To explain the occurrences of these types of anæmia with hypothyroidism the author points out that there is only one known cause for hypertrophy of the hæmatopoietic tissue, namely, a deficient supply of oxygen to the tissues, and hence in myxœdema, with a diminished consumption of oxygen in the tissues, *i.e.*, a relative local surfeit of oxygen, there will be an atrophy of the hæmatopoietic tissue and a simple hyperchromic anæmia. On the other hand, in other types of this anæmia, as in those resulting from deficiencies, there exists a state of oxygen deficiency and hyperplasia of the bone-marrow. Thus a patient with the second or third type of anæmia could be treated with the deficient iron or liver factor alone, and with the bone marrow in a state of normoblastic hyperplasia gain a rapid response. However, because of the associated myxœdema, there would now be a relative oxygen surfeit in the tissues, with resultant bone marrow atrophy and the development of the first or hyperchromic type of anæmia. This needs prolonged treatment with thyroid and the deficient factor.

From these facts the author postulates that the thyroid hormone has no direct effect on the maturation of the red blood cells and that in the development of anæmia associated with myxœdema the thyroid is only indirectly concerned, a state of hypothyroidism resulting in a diminished oxygen-consumption in the tissues, which in turn results in depression of the bone marrow and anæmia.

T. STEWART PERRETT

Prophylactic and Curative Effect of Vitamin K in Hæmorrhagic Disease of the Newborn (Hypothrombinæmia hæmorrhagica, neonatorum): Preliminary report. Nygaard, K. K.: *Acta Obst. et Gyn. Scandinavica*, 1939, **19**: 361.

These studies indicated that a normal prothrombin time was maintained during the first ten hours after delivery but that a definite reduction of the prothrombin content becomes apparent during the second half of the first day. This low level is maintained during the following five days. From the sixth day prothrombin returns to the level found at birth. Studies on

the prothrombin content of some of the newborn infants with hæmorrhage disclosed that in the majority of cases the onset of hæmorrhage coincides with the period of transitory physiological hypothrombinæmia. Hæmorrhages of the newborn generally occur when the physiological hypothrombinæmia exceeds that which is normally present at the time of life. This condition they named hypothrombinæmia hæmorrhagica neonatorum. Experiments with vitamin K revealed that the development of transitory hypothrombinæmia apparently can be successfully prevented by the administration of vitamin K immediately after delivery. This may lead to effective prophylaxis of hypothrombinæmia hæmorrhagica neonatorum. Vitamin K administered to three with this type of hæmorrhage exhibited a therapeutic effect equaling that of blood transfusion. S. R. TOWNSEND

Control of Prothrombin Deficiency in Obstructive Jaundice by Use of Vitamin K. Stewart, J. D. and Rourke, G. M.: *J. Am. M. Ass.*, 1939, **113**: 2223.

From their studies the authors conclude that prothrombin deficiency in obstructive jaundice depends on such factors as duration and degree of biliary obstruction, infection, avitaminosis K and malnutrition. The response to vitamin K-cholic acid mixture is immediate, except with rapidly progressing liver damage. Massive pathological bleeding may occur with prothrombin values below 40 per cent. Hyperprothrombinæmia during vitamin K-cholic acid therapy was not observed during their studies. They feel also that in treating prothrombin deficiency in obstructive jaundice it is important to also administer dextrose and proper fluids and carry out early decompression of the biliary tract.

S. R. TOWNSEND

Plasma Prothrombin Content of Bank Blood. Pastore, J. B. and Lord, J. W.: *J. Am. M. Ass.*, 1939, **113**: 2231.

Bank blood is an adequate source of plasma prothrombin for about nine days. At longer intervals of storage the plasma prothrombin declines gradually, reaching the level of 61 per cent of normal by the end of the third week of storage. Carefully controlled refrigeration of bank blood is an important factor in the preservation of plasma prothrombin.

S. R. TOWNSEND

The Quantity of Blood Required to Produce a Tarry Stool. Daniel, W. A. and Egan, S.: *J. Am. M. Ass.*, 1939, **113**: 2232.

In their experiments on healthy medical students it was found that 50 to 80 c.c. of blood when taken by mouth were necessary for the production of a tarry stool. S. R. TOWNSEND

Pathology and Experimental Medicine

Thirty-nine Cases of Appendicitis in a Single Family Pedigree. Perry, T. and Keeler, C. E.: *Am. J. Surg.*, 1939, **46**: 259.

After reviewing 18 families whose histories have been recorded in the literature, to show the hereditary predisposition toward developing appendicitis, the authors present two pedigrees of their own. Some of the families reviewed are of peculiar interest, in that some anatomical peculiarity was present in the appendix in addition to the infection. Thus one family lacked 1.5 cm. of the meso-appendix. Here three brothers, their father and grandfather had been similarly affected. Another family showed large angulated appendices in a mother and five of her six children, all operated upon for appendicitis. Short thick appendices with wide openings were found in two sisters, their three brothers being normal, and in the two daughters of one of the sisters, and in the six daughters of the other. The three and four sons respectively of these two women were normal.

In the first family reported by the authors an entire family, three sisters and three brothers, had been operated upon for appendicitis; and coiled, retrocæcal appendices were found in every instance. The two children of one sister, the child of a second sister, and one of the two children of the third sister had been operated upon and retrocæcal appendices found. The three brothers each had two children who had not had any appendiceal attacks.

The second pedigree is quite complicated because there had been some intermarriages in the family, two brothers marrying two sisters. In four generations, however, there have been 39 affected persons, 23 of them women and 16 men. In one branch of the family the affected persons formed but 6.5 per cent of the group, while in the other branch they formed 35 per cent. An analysis of the pedigree does not show whether the trait is inherited as a dominant or a recessive, neither interpretation being supported by the data, but that appendicitis is dependent upon strong hereditary factors in this family is quite unmistakable. MADGE THURLOW MACKLIN

Immunological Studies on Patients with Pneumococcic Pneumonia Treated with Sulfapyridine. Finland, M., Spring, W. C. and Lowell, F. C.: *J. Clin. Investigation*, 1940, **19**: 179.

The authors report the results of immune studies in patients with pneumococcic pneumonia treated with sulfapyridine. A small number of cases treated with specific serums in addition are also included. Bactericidal and phagocytic tests were also carried out in many cases associated with types I, III, and V pneumococci.

The results of the bactericidal tests indicated that the blood of patients undergoing treatment with sulfapyridine has marked bacteriostatic and considerable bactericidal action on the homologous type of pneumococcus. This effect was independent of the immune mechanism residing in the blood. This action of sulfapyridine was the same as that noted when comparable concentrations of the drug are added to artificial media or to human blood *in vitro*. The greatest and most rapid bactericidal activity occurred in the presence of heat-stable antibodies (agglutins, protection, opsonins).

The results of tests for bactericidal action at the end of three hours indicate that the pneumococcidal action resulting from the immune mechanism is exerted rapidly and is practically carried to completion before any bacteriostatic effect of sulfapyridine becomes evident.

The antibody response of patients with pneumococcic pneumonia treated with sulfapyridine, as far as could be determined, was comparable in every respect with that resulting from spontaneous recovery. Protective antibodies rarely developed before the sixth day and agglutinins rarely appeared before the seventh day of disease.

Entirely apart from observed clinical results, and only from the point of view of the mechanism of action of serum and sulfapyridine as observed in patients undergoing treatment, the combination of these two agents is the treatment of choice.

S. R. TOWNSEND

The Relation of Methæmoglobin to the Cyanosis Observed After Sulfanilamide Administration. Vigness, I., Watson, C. J. and Spink, W. W.: *J. Clin. Investigation,* 1940, **19**: 83.

Following their investigation the authors feel that the cyanosis observed in man following sulfanilamide therapy is explained by the presence of methæmoglobin (rarely sulfhæmoglobin). Methylene blue abolishes the cyanosis due to methæmoglobin (and other pigments if present, except sulfhæmoglobin), and the spectral distribution curve of the blood becomes normal.

Spectrophotometric studies of the blood of sulfanilamide-treated patients have failed to reveal the presence of pigments other than methæmoglobin in quantities large enough to contribute appreciably to cyanosis.

S. R. TOWNSEND

Studies on the Action of Sulfapyridine on Pneumococci. Spring, W. C., Lowell, F. C. and Finland, M.: *J. Clin. Investigation,* 1940, **19**: 163.

Growth curves in a favourable artificial medium and tests with human blood originally lacking in pneumococcidal properties indicated that sulfapyridine has considerable bacteriostatic and bactericidal action on pneumococci. The degree of bacteriostasis or of bactericidal action depends on the concentration of the drug and the number of pneumococci inoculated. Under the conditions of the experiments growth invariably occurred before the sulfapyridine exhibited its effect.

Type-specific immune serum confers marked pneumococcidal properties on fresh human blood originally lacking in such properties. Both the sulfapyridine and the immune serum are effective in normal human blood and in the blood of patients with pneumococcic pneumonia. The combinations of small amounts of serum and sulfapyridine is more effective than either agent used separately in the same amounts. The destruction of pneumococci in the presence of immune serum is rapid, whereas the action of sulfapyridine is considerably delayed.

S. R. TOWNSEND

Hygiene and Public Health

Riboflavin Deficiency in Man (Ariboflavinosis). Sebrell, W. H. and Butler, R. E.: *Public Health Reports,* 1939, **54**: 2121.

A syndrome "pellagra sine pellagra" has been described for many years, consisting of certain symptoms of pellagra without the dermatitis. Particularly there has been described a lesion in the angles of the mouth (angular stomatitis) and a seborrhœic accumulation about the nose which has cleared up following the ingestion of yeast. The present article deals with a study of 18 adult white females in a mental institution, who, under well controlled conditions, were given a diet well balanced so far as protein, fats and carbohydrates were concerned, with adequate amounts of iron, calcium, phosphorus and iodine, and well supplied with vitamins A, B_1, C and D. The chief deficiency in the diet was in the nicotinic acid and riboflavin content.

On this diet 10 of the 18 women developed symptoms similar to those described as pellagra sine pellagra between the 94th and 130th days. There was maceration at the angles of the mouth, the lips were reddened, and the mucosa appeared thin, shiny and denuded. There was a scaly, greasy desquamation in the naso-labial folds. One of the women developed the skin lesions of pellagra, which disappeared after the daily administration of 30 mg. of nicotinic acid in 30 days. The lips, however, did not heal until riboflavin was given. Five other women with the lip and nose lesions were given 100 mg. of nicotinic acid daily without benefit. They too recovered following the addition of riboflavin to the diet. The remaining four women were not given nicotinic acid but were given riboflavin. Their lesions completely disappeared.

After the lesions had healed all ten women were deprived of riboflavin and continued the controlled diet. All ten had a recurrence of the mouth and nose lesions in from 177 to 293 days. Again riboflavin was added to the diet and again the lesions disappeared.

FRANK G. PEDLEY

Obituaries

Dr. John Andrew Amyot, of Ottawa, formerly Deputy Minister of Health, Canada, died on February 13, 1940, after a lengthy illness, in his seventy-third year.

Dr. Amyot was a native of Toronto, and a descendant of a distinguished French family which came to Canada four centuries ago. He was educated in Toronto, and graduated in medicine from the University of Toronto in 1891, becoming assistant surgeon at St. Michael's Hospital in 1894, and surgeon in 1898. Later he joined the staff of the University of Toronto as demonstrator in pathology.

Dr. Amyot retired as Deputy Minister in 1933 because of failing health. He was a leader in preventive medicine and sanitation and was almost as well known in the United States as in Canada, having done noteworthy work in 1912 and 1913 in investigating pollution of the Great Lakes as a member of the International Joint Commission. He took a leading part in introducing into Canada the filtration and chlorination of water and the pasteurization of milk, decreasing materially the number of deaths from typhoid in Canada.

Dr. Amyot went to England with the Canadian Expeditionary Force in 1915 as a member of the staff of No. 4 General Hospital, University of Toronto, and won immediate recognition. He became Deputy Minister in 1919 and under his supervision the department was organized and the co-operation of provincial and local health authorities in Canada was secured. It was Dr. Amyot who established in Toronto the first public health diagnostic laboratory in North America in 1890 under the Provincial Board of Health of Ontario.

Dr. William Lincoln Bond, of Toronto, died suddenly on February 7, 1940. He was a graduate of the University of Toronto (1890).

Dr. Julian Southworth Boyd, of Simcoe, Ont., died on February 12, 1940, aged fifty-one. He was chief of the surgical service of Norfolk General Hospital and in 1916-17 was military commandant of the Canadian Army Medical Corps at Camp Borden, Ont., later serving in France.

Dr. Boyd had been chairman of the Simcoe Public Utilities Commission since 1936.

Dr. George Milne Brodie, of Woodstock, Ont., died on January 6, 1940, in his eighty-fourth year. He was a graduate of Victoria University (1886).

Dr. Ronald Geddes Calder, of St. Catharines, Ont., died on January 6, 1940, aged thirty-seven. He was a graduate of the University of Toronto (1930).

Dr. William N. Condell, of Edmonton, Alta., died early in December, 1939, one of the pioneer doctors of that district. A graduate of Queen's University (1898), he registered in Ontario in 1899, and practised for five years at Spencerville. He came west before the Province of Alberta was formed, and settled in Edmonton in 1904, where he practised his specialty of eye, ear, nose and throat diseases. He was a progressive citizen and took his part in the development of the city.

Dr. Franklin Fisher, of Corner Brook, Newfoundland, died at Clearwater, Florida, on February 3, 1940. He was in his 66th year. After completing his arts course at Dalhousie University in 1900 he proceeded to McGill University where he graduated in medicine in 1904. His whole professional life was spent in his birth-place, the Bay of Islands, on the west coast of Newfoundland, his practice extending over an area of 100 miles. Physically it was an extremely hard practice, especially in the spring and fall, due to climatic and geographical conditions.

In 1925 Dr. Fisher joined the staff of the newly constructed Corner Brook General Hospital, where his vast fund of clinical experiences and personal knowledge of patients, was extremely valuable and available at all times. In September, 1934, at the completion of a very difficult breech delivery in an outlying settlement, he suffered a cerebral hæmorrhage, and collapsed at the bedside of his patient. Since that date, he has lived in retirement, spending most of his time at Clearwater, Florida, in company with his family. His remains have been laid to rest in Clearwater. It is appropriately remarked "A native son who well served his native land".

Dr. Arthur Wellington Furness, of Montreal, died on January 14, 1940, aged fifty-nine years.

Dr. Wilbur Howard Harris, of Toronto, died on February 6, 1940, in his seventy-sixth year. He had practised medicine in Toronto for forty-seven years.

In 1793 William Myndert Harris, a staunch United Empire Loyalist, began the carving of a farm from the woods of the fourth concession in Hope township. This man, who was the grandfather of Dr. Harris, was born in Nova Scotia. His father had drawn lots for land there when the exodus of United Empire Loyalists took place from the 13 colonies. He came to Ontario when Port Hope was just beginning to be a trading centre. Assisted by Governor Simcoe, he established himself at the junction of Smith's Creek and Lake Ontario. That place is now Port Hope. His son, Charles, was the father of the late Dr. W. H. Harris.

Dr. Harris was a graduate of Trinity University, Toronto (1888). He was associated with the Hospital for Incurables before he went to Grace Hospital in 1899. He started on the outside staff with a clinic twice a week for out-patients. Within a few months he was assistant general surgeon on the inside staff. By 1911 he was senior surgeon. In 1914 he was chairman of the medical and surgical staff.

In 1920 Dr. Harris was chairman of the Academy of Medicine's committee which reported on the Glover Serum. He was also chairman of the Academy's committee on cancer research work. In 1922 he became President of the Academy.

Dr. Percival Hearn, of Clinton, Ont., died on February 12, 1940. He was a graduate of the University of Toronto (1915).

Dr. Robert Johnston, of Tamworth, Ont., died on January 27, 1940. He was born in 1903 and graduated from Queen's University, Kingston, in 1933.

Dr. Hedley Vicars Kent, died at his home in Truro, N.S., on January 31, 1940. He was 80 years of age, and in his fiftieth year of active medical practice.

Dr. Kent was born in Truro. He studied medicine at Dalhousie University and graduated in 1890. He returned to Truro and punctuated his many years of practice there with post-graduate study in London, Paris and on this continent. Always active in the social life of his profession and his community, he held many offices in the local and provincial medical societies and did pioneer work with the Tuberculosis League.

Dr. Perley Taylor Kierstead, of Fredericton, N.B., died on January 15, 1940, in his eighty-first year.

Dr. Kierstead was born at Snider Mountain, N.B., May 29, 1859, a son of the late William and Margaret Kierstead. He received his early education in Sussex and attended Provincial Normal School in Fredericton, receiving his license and teaching for some time. He later took up the study of medicine at Dartmouth Medical College (M.D., 1884), and practised his profession in New Brunswick for over 50 years, 25 of

which were spent at Woodstock. He also practised at Sheffield for some years before coming to Fredericton a few years ago to make his home with his daughter.

Dr. James Mitchell Nairn, of Toronto, an active physician for forty-four years, died recently. He was eighty-one years of age. Born in Guelph, Dr. Nairn began his practice at Port Dover. He came to Toronto in 1923, retiring ten years ago. He was a graduate of Victoria University (1886).

Dr. William Thomas Owen Parry, for fifty-five years a practising physician in Toronto and for more than twenty-five years physician at the Don Jail, died on February 1, 1940. He would have celebrated his eighty-first birthday on February 16th.

Dr. Parry was born at Dunnville, and received his education at Victoria University, Toronto (1885), and took post-graduate work in London, where he received the degrees of Licentiate of the Royal College of Physicians and Member of the Royal College of Surgeons. Later he spent time in study in Vienna. Returning to Canada, he opened a practice in Toronto. He retired from medical services in connection with the Don Jail in 1935.

Dr. Robert Millard Payzant, of Liverpool, N.S., died on November 22, 1939. He was born at Lockeport, N.S., and studied at Salt Lake City, Utah, and Providence, R.I. He conducted a medical practice in both these cities before coming to Liverpool 25 years ago.

Dr. James Robertson, of Verdun, Que., died on January 6, 1940, aged sixty-seven. He was born in Point St. Charles, Montreal, and as a youth went to the United States. He was a graduate of the Hahnemann Medical College, Chicago (1910), and subsequently worked in the City and County Hospital, San Francisco. Then he returned to Montreal and was connected with the Homœopathic Hospital until 1911, when he began practice in Verdun.

Dr. Robertson had been a member of the Verdun Protestant School Board for the past seven years, and was also medical officer for the Protestant schools in Verdun.

Dr. John Benjamin Stallwood, of Beamsville, Ont., died on January 11, 1940, aged sixty-two. He was County Physician and Chairman of the Beamsville Board of Education. For many years he was M.O.H.

Dr. Stallwood was a graduate of the University of Toronto (1904).

Dr. Robert Bruce Wells, of Edmonton, died on January 30, 1940.

He was born in Canada in 1867 and graduated from Toronto University in 1894. He registered in Ontario and practised first at Durham and later at Delhi, Ont. Coming to Alberta just after the Province of Alberta was formed, he practised his specialty of eye, ear, nose and throat until he retired about five years ago. He was an authority on art and few homes in western Canada had an equal number of fine oil paintings.

Precious little our fathers knew,
Precious little, when all is said,
Most of their teachings were quite untrue,
Most of their remedies cured your dead.
But down from the heavens or up from the mould,
Send us the hearts of our fathers of old.

—Dr. Joseph C. Doane, *The Diplomate*, 1940, **12**: 17.

News Items

Alberta

The annual meeting of the Council of the College of Physicians and Surgeons of Alberta elected Dr. Richard Parsons, Red Deer, Alberta, president, and Dr. R. B. Francis, Calgary, Vice-president, for 1940. Dr. Parsons is a graduate of Trinity University (1901) and Dr. Francis, of University of Toronto (1908).

The members of the Council had an interview with the Premier, the Hon. William Aberhart, and his cabinet. Among the questions under discussion, were the following.

1. The creation of a fund to cover medical care and hospitalization for victims of road accidents. The fund to be fifty cents or half the fee for driver's licences, handled by the Workmen's Compensation Board. No compensation to be given the victims.

2. It has been frequently stated by cabinet ministers that the Government was in favour of state medicine, and the Council desired to have the matter clarified. The Premier stated that in his mind the broad principle was that adequate medical care and hospitalization should be available to every citizen of Alberta, but how it should be accomplished was not decided.

3. The advisability of enacting a basic science law. The matter was discussed at length but no conclusion arrived at. Were such a law enacted all future applicants would have to pass an examination before the Basic Science Board or present a certificate of equal standing from some reputable institution. This would apply to all cults practising curative methods.

4. Better arrangement for proper medical care of those on relief and the indigents. Where municipalities recognize the patient as their responsibility and guarantee his hospitalization they should guarantee his medical care as well. The Government should have a uniform system similar to that of Ontario for those on relief.

The Council made the usual grant for medical scholarships to the University of Alberta, *viz.*, $250; also a grant to the Medical Library of the University of $200 and to the fund for the History of Medicine $50.

Arrangements were made with the Government to issue special plates for physicians' cars from 60,001 to 60,999.

The Council decided to exempt all medical men overseas from their annual dues while away from Canada.

G. E. LEARMONTH

British Columbia

The Greater Vancouver Health League, through its Social Service Section, has been engaging in publicity with regard to the Venereal Disease problem in British Columbia.

A dinner was held on February 1st, at which the Honourable G. M. Weir, Provincial Secretary, and Dr. G. F. Amyot, Provincial Health Officer, were present and spoke. Dr. D. H. Williams, Director of the Venereal Disease Section of the Provincial Health Department, spoke upon the condition of affairs in British Columbia at present, and Mr. Edgar Brown, Executive Secretary of the Health League, reported on a survey that has recently been made in Vancouver with the aid of practising physicians.

The Canadian Broadcasting Corporation afforded the privileges of broadcasting for half an hour, and the subjects of Drs. Weir and Williams were broadcast to the province at large.

Mr. Brown's figures were very instructive and showed a present number of at least 2,000 cases of venereal disease undergoing active treatment in Vancouver and reported for the past year. An interesting feature was the large number of cases of syphilis as compared to a somewhat smaller number of gonorrhœa than might have been expected.

The medical profession of Vancouver co-operated very well indeed in the preparation of this survey, and it is hoped that future surveys will be even more complete and accurate.

The new District Medical Officer of Military District No. 11 is Lieut.-Col. A. L. Jones, O.B.E., M.C., R.C.A.M.C. Lieut.-Col. Jones practised at Revelstoke for many years, served in the last war, where he received the Military Cross, and his appointment to this position is thoroughly popular in British Columbia.

The papers read at the annual meeting of the British Columbia Medical Association in September, 1939, have now been collected, edited, and are being published in the form of a Supplement to the *Bulletin of the Vancouver Medical Association.* The British Columbia Medical Association is responsible for this publication.

Dr. S. Cameron MacEwen, of New Westminster, member of the Council of the College of Physicians and Surgeons of British Columbia has resigned his seat on account of illness. This is greatly regretted by the entire profession of British Columbia. Doctor MacEwen, as Chairman of the Committee on Economics of the Council, has done great service to the profession for the past two years, and it is sincerely hoped that he will make a speedy recovery. His place is taken by Dr. W. A. Clarke, of New Westminster, both on the Council and as Chairman of the Committee on Economics.

Captain E. E. Day, R.C.A.M.C., has gone to Victoria as Principal Medical Officer of the Western Air Command.

The Osler Dinner of the Vancouver Medical Association, which was to have been held on March 5th, has been postponed owing to the unfortunate illness of Dr. G. F. Strong, who is this year's Osler Lecturer.

The secretary of the British Columbia Medical Association reports continued good results in the collection of fees for the Canadian Medical Association.

J. H. MACDERMOT

Manitoba

Dr. Murray Campbell has been appointed Superintendent of Dynevor Hospital for tuberculous Indians. Dr. Minish, who had been acting Superintendent, has accepted a position at Manitoba Sanatorium, Ninette.

Dr. George F. Stephens, Superintendent of Winnipeg General Hospital and a graduate of McGill, has been appointed a Governor of McGill University.

The new Johnson Memorial Hospital at Gimli, Man., was officially opened on January 28, 1940, by his Grace, Most Reverend A. A. Sinnott, Archbishop of Winnipeg. The Archbishop paid a tribute to the late B. Johnson, of Gimli, who left $15,000 for the erection of a hospital. Hon. I. B. Griffiths, Minister of Health and Public Welfare, said that this hospital was the most modern of its kind in the province and brought to 45 the number of hospitals in Manitoba. He commended Manitoba religious and service organizations that have assisted in financing the erection of 18 rural hospitals. The building is three storeys in height, measuring 70 x 40 feet, with an extension on the south wing of 10 x 18 feet. An elevator has been installed, and heating and lighting, together with running water and sewage systems with respect to rural standards, are modern in every respect. There are 40 beds. The hospital will be administered by Sisters of the Benedictine Order.

Dr. P. H. T. Thorlakson, Surgeon at the Winnipeg General Hospital, was presented with the insignia of the Icelandic Order of the Falcon by Mr. G. L. Johannson, Danish-Icelandic consul at a service held Sunday, January 21st, in First Lutheran Church, Winnipeg. Mr. Johannson received a similar order from Dr. C. C. S. Fremming, vice-consul. The Order was given in recognition of their contributions to Icelandic culture.

A meeting of the medical profession of Winnipeg was held in the Medical College on the evening of February 16th. Dr. E. S. Moorhead, Chairman of the Committee on Economics, Canadian Medical Association, Manitoba Division, laid before the meeting the details of a proposed arrangement between the doctors of Winnipeg and the city firefighters and their dependants for medical care. A schedule of fees was presented which in no case was lower than the fee set by the Workmen's Compensation Board of Manitoba. Dr. Moorhead explained that the firefighters had approached the Winnipeg Medical Society in order to secure health insurance. The task of conducting negotiations was entrusted to the Committee on Economics. In the scheme proposed hospital costs would be met by the Manitoba Hospital Service Association, provided the firefighters became members of this Association, and the doctors would be responsible for the medical care.

ROSS MITCHELL

New Brunswick

Dr. L. DeV. Chipman was re-elected President of the New Brunswick Red Cross Association at the annual meeting held in Saint John on February 1st. The Red Cross activities here, as elsewhere, have shown a tremendous increase since the declaration of war, the number of local branch societies having increased from twenty to seventy. Dr. Chipman has had a long association with the Red Cross Society in this province and has again assumed this added responsibility during war time.

Contributions from municipalities and individual donors are coming in very satisfactorily to provide for the furnishing of the new wing of the Victoria General Hospital at Fredericton.

Dr. William Warwick, chief medical health officer of New Brunswick, has been granted a three-months' leave of absence because of ill health. Dr. Warwick has been ill for some little time. Dr. Charles W. McMillan, Saint John District Medical Officer of Health, has been appointed acting chief medical health officer during Dr. Warwick's absence.

The monthly meeting of the Saint John Medical Society was held in the Admiral Beatty Hotel on January 31st. Dr. Norman Skinner, of the medical staff of the General Hospital, Saint John, was the special speaker and his paper was on "Allergy" and contained a description of the work recently done by him during his post-graduate course in New York. As usual, at the meeting of the Saint John Medical Society, the discussion provided probably as much interest as the paper presented.

The authorities of Military District No. 7 have now opened a military hospital at Howe Lake, just outside of the city of Saint John.

A. STANLEY KIRKLAND

Nova Scotia

While operating a general hospital has never been considered a lucrative work, many of the small hospitals throughout the province, showing a larger number of patient-days for 1939 than ever before, have been able to balance their budgets with small operating profits. The Highland View, Amherst, showed a sur-

plus of almost $4,000, a quarter of this coming from the tuberculosis annex, which of course receives generous government support. The Blanchard-Fraser Memorial Hospital, Kentville, for its first year, showed an actual revenue over expenditure of $500, which was only a few dollars in excess of that shown by the neighbouring Eastern Kings Memorial Hospital at Wolfville. The financial standing of the Wolfville institution is particularly remarkable, because its number of admissions dropped 45 per cent with the opening of the nearby Kentville hospital.

The Annapolis General Hospital, Annapolis Royal, has opened its doors, forming another link in the chain of small hospitals serving the people of Nova Scotia's famous valley. A modern operating room and x-ray equipment, with six private rooms and small wards, make it an excellent workshop for the profession of the community and an asset in the welfare of the inhabitants.

Dr. J. J. Cameron has been appointed health officer to Antigonish County, and Dr. D. J. MacMaster health officer to the County Home.

Dr. B. A. LeBlanc has been appointed health officer for Richmond County.

Dr. L. R. Ryan has taken up practice in Sheet Harbour.

Dr. D. R. McRae has been appointed to the board of the Harbour View Hospital, Sydney Mines, as representative of the provincial health department, filling the vacancy created by the resignation of Dr. D. W. Archibald.

Despite heavy chlorination which has brought complaints from those using the town water supply, the bacillus coli has again appeared in Amherst drinking water, making a thorough investigation by the provincial health department imperative.

Plans for a new wing to the Aberdeen Hospital, New Glasgow, are being drawn up, as the board of management again reported a year in which the building was constantly overcrowded. ARTHUR L. MURPHY

Ontario

The George Armstrong Peters Prize of the University of Toronto has been awarded to E. H. Botterell, M.D.

Word has been received of the death of Dr. Robert Dewar Mackenzie, M.C., of Detroit, a graduate of the University of Toronto, 1914. His army service as recorded in the University of Toronto Roll of Service is as follows:

C.A.M.C., Camp Hosp., M.D. 2, Capt., Feb. 1916; o/s. Aug. 1916; M.O. Res. Bns.; France Feb. 1917, No. 1 Can. Fd. Amb.; M.O. 15th Bn., Mar. 1917; No. 1 Can. Fd. Amb., Oct. 1917; M.O. 15th Bn., Apl. 1918; No. 2 Can. Fd. Amb., Nov. 1918; A/D. A.D.M.S., 1st Can. Div., Dec. 1918; D.A.D.M.S., G.H.Q., Jan. 1919, Vimy, Lens, Hill 70, Passchendaele, Amiens, Drocourt-Queant, Cambrai—Mons; Wounded, Hill 70, Aug. 15, 1917; M.C., Drocourt-Queant, Sept. 1918.

It has been announced that Sir Frederick Banting will take charge of a research laboratory at a new military hospital to be erected and equipped by the Canadian Red Cross at the Cliveden estate at Taplow, England.

Dr. W. D. Smith, former M.P.P. for Dufferin-Simcoe and Superintendent of the Ontario Mental Hospital at St. Thomas up to the time of its transfer to the Royal Canadian Air Force, has been appointed Commissioner of the Workmen's Compensation Board. J. H. ELLIOTT

United States

The American Association for the Study of Goiter will hold its meeting at Rochester, Minn., April 15, 16 and 17, 1940. The program will consist of papers dealing with goitre and other diseases of the thyroid gland; dry clinics conducted by guests of the Association; and operative clinics conducted by the staff of the Mayo Clinic.

The Association is offering the Van Meter Prize Award for the best essay presented in competition in accordance with the regulations. W. Blair Mosser, M.D., Kane, Pa., Corresponding Secretary.

Book Reviews

Surgery of the Hand. J. H. Couch. 147 pp., illust. $1.50. University of Toronto Press, 1939.

A remarkably concise and very informative book which can be easily read in two hours or less. Certain parts deserve special mention. The sections dealing with examination, diagnosis and principles of treatment should be read by all who come in contact with hand surgery. They alone are worth many times the price of the work.

Dr. Couch's prejudice against the use of splints following tendon suture will not be universally agreed to. Many prominent surgeons believe that reliance should not be placed on the strength of suture but rather on immobilizing the joints in plaster so that the muscle involved will be in complete relaxation. This does not mean complete finger fixation and need not interfere with early active motion.

Exception must also be taken in Chapter IV, "Levels of Amputation", as regards the treatment of the index finger. Few experienced surgeons will agree with figure 14, "Correct Amputation of Index Finger Including Entire Metacarpal". There is no doubt that the removal of the proximal end of this metacarpal weakens the proximal transverse arch of the hand and results in impairment of thumb function. Figure 10, "Thumb Useless Because Fingers Gone and Nothing to Oppose", may mislead unless the text is carefully studied.

Dr. Couch's principles as regards amputations in general are rather more radical than those usually accepted. The danger is that some may read into his book the theory of certain compensation boards and insurance companies that it is more economical to pay the often pitifully small compensation allowed for the loss of a finger or some other part of a limb rather than to pay the frequently much greater sum in salary and medical costs during time necessary to restore or reconstruct the injured member.

Part II, "Infections of the Hand", cannot be too highly praised. Probably no book on the subject has ever been published giving such valuable material in so little space. Chapter IX, "Cellulitis", apparently refers to what is more commonly spoken of as "lymphangitis".

Diseases of the Foot. E. D. W. Hauser. 472 pp., illust. $6.75. McAinsh, Toronto, 1939.

This is a most useful monograph. It gathers together within the covers of a compact book a fund of knowledge regarding the much neglected but disabling ailments of the foot. Moreover, it has been written by one with an immense experience in this

field. Such a monograph, as it deals with such frequent occurrences, cannot fail to be useful.

After a brief but clear introduction based upon the anatomy and physiology of the foot the various foot disabilities are discussed in separate chapters. The descriptions are clear, the numerous illustrations are exceptionally good, and treatment is adequately covered. If some common appliances of treatment, such as Whitman's plate are omitted, the author at least replaces them with others born of his own experience. The work is recommended to practitioners, orthopædic surgeons and surgeons in out-patient clinics.

Manual of Urology. R. M. LeComte. 2nd ed., 295 pp., illust. $4.00. Williams & Wilkins, Baltimore, 1939.

The second edition of this work is considerably enlarged by the addition of chapters on neuromuscular physiology of the bladder, impotence, and sterility. New developments in chemotherapy, such as sulfanilamide, and new procedures, such as prostatic resection, are included. If one were to make any criticism, it might be suggested that a little more space should have been devoted to these latter revolutionary advances and possibly a little less to those first mentioned. The work, however, remains a concise authoritative reference which fills a definite need, both for students and practitioners.

Rectal Surgery. W. E. Miles. 359 pp., illust. $5.50. McAinsh, Toronto, 1939.

This is a most praiseworthy volume. It is written out of the personal experience of an expert of long standing. There is not a line of padding in it and the subject is covered completely. The chapter on fistulæ is particularly good. Teachers of surgery will find it very helpful, and the inexperienced surgeon will be properly warned of complications that might be of serious import. The anatomy of the pecten band and its importance in several diseases of the rectum is stressed repeatedly. Such conditions as benign stricture and ulceration are well explained.

The section on malignant disease of the rectum is a logical exposition of the necessity for radical treatment in every case. The spread of disease along the lymphatics is graphically shown and fully described. The impossibility of dealing with secondary gland involvement by the use of radium is well argued. There is, however, no mention of treatment by high voltage x-ray. It is gathered that such therapy would not be approved. Mention is made of several operative procedures, but the superiority of the abdominal perineal incision originally described by the author is convincingly argued.

The book is easy to read, the illustrations are excellent and the format a credit to the publishers.

Proctoscopic Examination and Diagnosis and Treatment of Diarrheas. M. H. Streicher. 149 pp., illust. $3.00. C. C. Thomas, Springfield, Ill., 1939.

This small volume is printed on excellent paper, has many good drawings and photographs, and a good arrangement of the subject matter. The description of the author's method of proctoscopic examination is concise and easily followed, and in most instances the attempt to set forth the essential features of the disease causing the diarrhœa has been successful. The main drawback of the book is that it attempts too much. As a consequence the writing is unduly sketchy. This is particularly noticeable in the discussion of treatment, and the physician who has to deal with an intractable diarrhœa will have to look elsewhere for guidance if he is to be ready to meet the variations and complications that may arise in the course of the disease he has under his care. One has the impression that the author has not a wide knowledge of gastroenterology or of general medicine. What he has to say about systemic disorders, benign extra-colonic tumours, and achlorhydria is rather vague and a trifle out-of-date. However, he may be wise, in a work of this size, in adhering to opinions that have the merit of being at the one time generally accepted and that are not yet completely discarded.

The book will be helpful to medical students and to the busy practitioner who is seeking a succinct review of the forms of diarrhœa that are commonly found in Canada and the United States.

The Abdominal Injuries of Warfare. G. Gordon-Taylor. 87 pp., illust. $3.00. Macmillan, Toronto, 1939.

This little book of eighty-seven pages carries sixty-eight illustrations. It deals with the grave emergencies which follow injuries by bullets or shrapnel or the equally serious consequences of exposure to high explosives from bombs. The author may be unique in the interest he has taken in wounded soldiers under his care during the great war. He is able to give the ultimate results of operations that were desperate attempts to save the lives of men suffering from multiple wounds of the viscera. Many of those he seems to have kept under his observation for twenty years. After reading this book a casualty clearing station surgeon could not but be encouraged to attempt the impossible. The surgeon in civil life will also find most valuable help in the management of severe injuries of the abdominal viscera.

Human Helminthology. E. C. Faust. 2nd ed., 780 pp., illust. $8.50. Lea & Febiger, Phila., 1939.

The second edition of Faust's now well known book has just been published. Numerous minor changes have been made since the first edition appeared, and it has been brought well up to date. It covers in almost encyclopædic form the entire subject of human helminthology, and consequently much of its material is of interest mainly to tropical workers. It does not neglect parasites of temperate climates, however, and it is an invaluable reference book which should be found in every library.

The Hospital Care of Neurosurgical Patients. W. B. Hamby. 118 pp., illust. $2.00. C. C. Thomas, Springfield, Ill., 1939.

Neurosurgery has now developed to the stage where it is almost entirely separated from general surgery. At any rate it has a distinct technique, and a special training is necessary for those who assist the neurosurgeon either as interns or as nurses if operations are to be done with safety and despatch.

This little book by Dr. Hamby has been prepared with the intention of giving guidance to those who are learning the principles of pre-operative and post-operative care of neurosurgical patients. It also outlines some of the elementary knowledge that is necessary for diagnosis and describes equipment and procedures some of which are useful in the wards of the general surgeon. Since it breaks new ground it has the shortcomings of all pioneering efforts, but these defects do not seriously lessen its merits. On the whole, it is a lucid and readable introduction to the work of the neurosurgeon. Although written primarily for interns and nurses it will be of value to the general practitioner in drawing to his attention the ways of relief that are now open to the sufferer from organic disease of the central nervous system, and will enable him to discuss more intelligently with his patient the risks, the complications, the duration, and the probable end-results of the treatment that is being recommended.

BOOKS RECEIVED

Attaining Womanhood. G. W. Corner. 95 pp. $1.00. P. B. Hoeber, New York, 1939.

Synopsis of Regional Anatomy. T. B. Johnston. 4th ed., 462 pp., illust. $4.50. Lea & Febiger, Phila., 1939.